Florida Department of Education
Curriculum Framework

Program Title: **Database and Programming Essentials**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8206400
CIP Number	0511080207
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMP PROG 7G
Additional teacher certifications accepted:	Any Academic Field PLUS appropriate industry certification.
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and entry-level database and internet/web related careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, and technical skills related to database and Internet technologies skills using the latest industry tools. This curriculum is project-based and modeled after the Oracle Academy.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point. It is recommended that students complete Algebra I and a programming/flow-charting course concurrently or prior to taking this program.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8207310	Digital Information Technology	1 credit		2	PA
	8206410	Database Fundamentals	.5 credit		2	VO
	8206420	Data Control and Functions	.5 credit		2	VO
	8206430	Specialized Database Programming	1 credit		3	VO
	8206440	Specialized Database Applications	1 credit		3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
8206410	#	#	19/83 23%	#	19/67 28%	#	1/69 1%	19/82 23%	#	19/74 26%	#
8206420	4/87 5%	4/80 5%	#	4/69 6%	#	4/70 6%	4/69 6%	0/82 0%	4/66 6%	#	4/72 6%
8206430	#	#	#	#	#	#	#	0/82 0%	#	#	#
8206440	19/87 22%	19/80 24%	#	19/69 28%	0/67 0%	19/70 27%	19/69 28%	0/82 0%	14/66 21%	0/74 0%	19/72 26%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
8206410	15/67 22%	13/75 17%	14/54 26%	16/46 35%	16/45 36%	18/45 40%	18/45 40%
8206420	3/67 4%	3/75 4%	3/54 6%	13/46 28%	13/45 29%	13/45 29%	13/45 29%
8206430	8/67 12%	14/75 19%	8/54 15%	11/46 24%	10/45 22%	11/45 24%	11/45 24%
8206440	8/67 12%	15/75 20%	8/54 15%	13/46 28%	13/45 29%	13/45 29%	13/45 29%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

Technical competencies following OCP A:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Database and Programming Essentials.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Database and Programming Essentials.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Database and Programming Essentials.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
19.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
20.0 Develop the process of creating an entity by identifying relationships.
21.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
22.0 Consider the degree and optionality of relationships of entities.
23.0 Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and Many-to-Many (M:M) relationships for building entity relationship diagrams.
24.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
25.0 Demonstrate proficiency in designing and adding complexity to an entity relationship model (ERM).
26.0 Apply the complex ERM information by fine tuning entities and the process for relating them.

27.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
28.0 Demonstrate proficiency in the technique of normalization by labeling and organizing all items in a database in such a way as to prevent any confusion of mistakes.
29.0 Demonstrate proficiency in table normalization by combining the techniques of an entity relationship model or a top-down, business approach to data with normalization or a bottom-up mathematical approach to data.
30.0 Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database.
31.0 Extend the ERM presentation model by normalizing the data and mapping the management system.
32.0 Apply techniques for building a storage management system by creating a website using templates and wizards.
33.0 Demonstrate storage closet design and functionality by constructing a group business presentation.
34.0 Demonstrate comprehension of database modeling competency through group presentation.
35.0 Demonstrate language arts knowledge and skills.
36.0 Demonstrate mathematics knowledge and skills.
37.0 Demonstrate comprehension that the database management software is a system for organizing the storage unit (or database) according to business needs and rules, through data integrity constraints.
38.0 Demonstrate comprehension of aspects of SQL Language interface by writing basic SQL statements.
39.0 Demonstrate proficiency working with columns, characters, and rows in SQL.
40.0 Demonstrate proficiency in using SQL comparison operators.
41.0 Demonstrate proficiency in using logical comparisons and precedence rules.
42.0 Demonstrate proficiency using SQL single row functions.
43.0 Demonstrate proficiency displaying data from multiple tables.
44.0 Demonstrate proficiency aggregating data using GROUP functions.
45.0 Demonstrate proficiency utilizing subqueries.
46.0 Demonstrate proficiency producing readable output with SQL language interface, reporting tool and manipulating data.
47.0 Demonstrate proficiency creating and managing database objects.
48.0 Demonstrate proficiency altering tables and constraints implementing views.
49.0 Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects.
50.0 Demonstrate ability to control user access and SQL language interface and reporting tool.
51.0 Demonstrate comprehension of bundling features of SQL.
52.0 Demonstrate comprehension working with composite data types by writing executable script files.
37.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database and Programming Essentials.
38.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Database and Programming Essentials.
39.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Database and Programming Essentials.
53.0 Describe the differences between SQL and PL/SQL
54.0 Create PL/SQL blocks.
55.0 Use variables in PL/SQL.
56.0 Recognize lexical units.
57.0 Recognize data types.
58.0 Use scalar data types.
59.0 Use various types of joins.

60.0 Use SQL group functions and subqueries.
61.0 Write PL/SQL executable statements.
62.0 Use nested blocks and variable scope.
63.0 Use good programming practices.
64.0 Write DML statements to manipulate data.
65.0 Retrieve data using PL/SQL.
66.0 Manipulate data using PL/SQL.
67.0 Use transaction control statements.
68.0 Use IF conditional control statements.
69.0 Use CASE conditional control statements.
70.0 Use basic loop iterative control statements.
71.0 Use WHILE and FOR loop iterative control statements.
72.0 Use nested loop iterative control statements.
73.0 Use explicit cursors.
74.0 Use explicit cursor attributes.
75.0 Use cursor for loops.
76.0 Use cursors with parameters.
77.0 Use cursors for update transactions.
78.0 Use multiple cursors.
79.0 Handle exceptions.
80.0 Trap Oracle server exceptions.
81.0 Trap user-defined exceptions.
82.0 Create procedures.
83.0 Use parameters in procedures.
84.0 Pass parameters.
85.0 Create stored functions.
86.0 Use functions in SQL statements.
87.0 Manage procedures and functions.
88.0 Manage object privileges.
89.0 Use invoker’s rights.
90.0 Create packages.
91.0 Manage package constructs.
92.0 Use advanced package concepts.
93.0 Manage persistent state of package variables.
94.0 Use Oracle-supplied packages.
95.0 Understand dynamic SQL.
96.0 Understand triggers.
97.0 Create DML triggers.
98.0 Create DDL and database event triggers.
99.0 Manage triggers.
100.0 Use large object data types.
101.0 Manage BFILES.

102.0 Manage indexes.
103.0 Manage dependencies.
104.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
105.0 Solve problems using critical thinking skills, creativity and innovation.
106.0 Use information technology tools.
107.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
108.0 Describe the importance of professional ethics and legal responsibilities.
109.0 Program a database application.
110.0 Utilize the basic concepts of database design.
111.0 Utilize SQL and UNION queries.
112.0 Implement program statements using objects.
113.0 Utilize debugging tools and write error handlers.
114.0 Demonstrate file I/O.
115.0 Create forms and identify all the properties of a form.
116.0 Manipulate data using object models
117.0 Develop custom controls.
118.0 Utilize API functions.
119.0 Demonstrate database replication and implement database replication using programming tools.
120.0 Analyze and implement security options.
121.0 Implement client/server applications.
122.0 Optimize the performance of a database.
123.0 Perform application distribution.
124.0 Test and debug databases.
125.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
126.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
127.0 Explain the importance of employability skill and entrepreneurship skills.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Database Fundamentals**
Course Number: **8206410**
Course Credit: **.5**

Course Description:

This data modeling course is designed to provide the foundation for future software engineers or database administrators. It transforms business requirements into an operational database utilizing a top-down systematic approach. Content includes creation of entity-relationship diagrams that accurately model an organization's needs and support the functions of a business, mapping of information needs into a relational database design, creation of physical relational database tables to implement database design, construction of a website that interacts with a database and generates report using web-based reports, and organization and composition of formal presentations, integrating multimedia software.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Database and Programming Essentials.		
	01.01 Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02 Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	

Florida Standards			Correlation to CTE Program Standard #
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Database and Programming Essentials.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Database and Programming Essentials.		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
03.04	Model with mathematics. MAFS.K12.MP.4.1		
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
03.06	Attend to precision. MAFS.K12.MP.6.1		

Florida Standards	Correlation to CTE Program Standard #
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society. – The student will be able to:		
18.01 Cite examples of jobs, salary, and opportunities he/she will have as a result of participating in the Academy.	LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.7,3.8,3.9 LAFS.910.L.3.6 LAFS.1112.L.3.6	
18.02 Describe the role a database plays in a business and predict its evolution.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5	
18.03 Demonstrate the difference between "data" and "information."	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.4.10 LAFS.1112.W.4.10	
18.04 Understand the importance of clear communication when discussing business informational requirements.		
18.05 Identify important historical contributions in database development and design.	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.L.3.6 LAFS.1112.L.3.6	
19.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs. – The student will be able to:	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.RI.4.10 LAFS.1112.RI.4.10 LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.01	Identify and analyze the phases of the database development process.		
19.02	Explain what conceptual data modeling and database design involve.	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.RI.4.10 LAFS.1112.RI.4.10 LAFS.910.L.3.6 LAFS.1112.L.3.6	
19.03	Compare database development process with that of the application development process.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6	
19.04	Distinguish between a conceptual model and a physical implementation.	LAFS.910.RI.4.10 LAFS.1112.RI.4.10 LAFS.910.L.3.6 LAFS.1112.L.3.6	
20.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
20.01	Identify and model various types of entities.		
20.02	Identify naming and drawing conventions for entities.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
20.03	Sequence the steps that are necessary for creation of an entity.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
20.04	Analyze and model the relationships between entities.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
21.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
21.01	Analyze and model attributes.		
21.02	Identify unique identifiers for each entity.	LAFS.910.W.3.7,3.8,2.4, 2.5,2.6 LAFS.1112.W.3.7,3.8,2.4, 2.5,2.6 LAFS.910.SL.1.1,1.2,2.4, 2.5 LAFS.1112.SL.1.1,1.2,2.4 2.5	
21.03	Develop an entity relationship diagram tagging attributes with optionality.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
22.0	Consider the degree and optionality of relationships of entities. – The student will be able to:	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6	
22.01	Create entity relationship models based on information requirements and interviews.		
22.02	Differentiate between one-to-many, many-to-many and one-to-one relationships.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.3.7,3.8,3.9, 2.4,2.5 LAFS.1112.W.3.7,3.8,3.9, 2.4,2.5	
22.03	Identify relationship between two entities by reading a given diagram.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.RI.3.10 LAFS.1112.RI.3.10	
22.04	Create a relationship between instances of the same entity.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.2.6 LAFS.1112.W.2.6	
22.05 Read an entity relationship model in order to validate it.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.4,2.5,3.7, 3.8,3.9 LAFS.1112.W.2.4,2.5,3.7, 3.8,3.9	
23.0 Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams. – The student will be able to:	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.RI.4.10 LAFS.1112.RI.4.10	
23.01 Identify the significance of an attribute that has more than one value for each entity instance.		
23.02 Evaluate appropriate methods of storing validation rules for attributes.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
23.03 Recognize unique identifiers inherited from other entities.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
23.04 Sequence the steps involved in resolving a many-to-many relationship.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
24.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
24.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).		
24.02 Resolve many-to-many relationships with intersection entities.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
	24.03 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
	24.04 Create exclusive entities and relationships by using subtypes and arcs, respectively.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 MAFS.912.S-ID.2.6	
	24.05 Identify initial layout for presentation and generate a list of action items for members of group.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
	24.06 Develop an entity relationship model using subtypes, supertypes and an exclusive arc.	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
25.0	Demonstrate proficiency in designing and adding complexity to an Entity – Relationship Model (ERM). – The student will be able to:	LAFS.910.SL.1.1,2.4,2.5 LAFS.1112.SL.1.1,2.4,2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
	25.01 Revise an entity relationship model according to the diagramming techniques covered in this course.		
	25.02 Define and give examples of hierarchical and recursive relationships.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,2.5,2.4 LAFS.1112.W.2.6,2.5,2.4	
	25.03 Differentiate between transferable and non-transferable relationships.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
25.04 Deliver a professional, formal business style presentation.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.L.3.6 LAFS.1112.L.3.6	
25.05 Evaluate and critique presentation layout, design and performance.	LAFS.910.SL.1.2,1.3,2.4, 2.5,2.6 LAFS.1112.SL.1.2,1.3,2.4 2.5,2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,2.5,2.4, 3.7,3.8,3.9 LAFS.1112.W.2.6,2.5,2.4 3.7,3.8,3.9	
25.06 Construct a model using both recursion and hierarchies to express the same conceptual meaning.	LAFS.910.SL.1.2,1.3,2.4, 2.5,2.6 LAFS.1112.SL.1.2,1.3,2.4 2.5,2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,2.5,2.4, 3.7,3.8,3.9 LAFS.1112.W.2.6,2.5,2.4, 3.7,3.8,3.9	
25.07 Distinguish between using date as an attribute and DAY as an entity.	LAFS.910.SL.1.2,1.3,2.4, 2.5,2.6 LAFS.1112.SL.1.2,1.3, 2.4,2.5,2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,2.5,2.4, 3.7,3.8,3.9 LAFS.1112.W.2.6,2.5,2.4, 3.7,3.8,3.9	
26.0 Apply complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:	LAFS.910.SL.1.2,1.3,2.4, 2.5,2.6 LAFS.1112.SL.1.2,1.3, 2.4, 2.5, 2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,2.5,2.4, 3.7,3.8,3.9 LAFS.1112.W.2.6,2.5,2.4, 3.7,3.8,3.9	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	26.01 Describe a relational database and how it differs from other database systems.		
	26.02 Define primary keys and foreign keys and describe their purpose.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.L.3.6 LAFS.1112.L.3.6	
	26.03 Describe what data integrity refers to and list some constraints.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.L.3.6 LAFS.1112.L.3.6	
	26.04 Explain how database design fits into the database development process.	LAFS.910.SL.1.1, 1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.L.3.6 LAFS.1112.L.3.6	
	26.05 Translate an entity-relationship model into a relational database design.	LAFS.910.SL.1.1, 1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.L.3.6 LAFS.1112.L.3.6	
	26.06 Document a database design using table instance charts.	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.RI.3.7 LAFS.1112.RI.3.7	
27.0	Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved. – The student will be able to:	LAFS.910.W.4.10,3.7,3.8, 3.9,2.6,2.5,2.4 LAFS.1112.W.4.10,3.7, 3.8,3.9,2.6,2.5,2.4	
	27.01 Demonstrate ability to implement six steps for mapping entity relationship models.		
	27.02 Document an initial database design on table instance charts.	LAFS.910.W.4.10,3.7,3.8, 3.9,2.6,2.5,2.4 LAFS.1112.W.4.10,3.7,3. 8,3.9,2.6,2.5,2.4	
	27.03 Recognize raw data and evaluate the steps for creating a data group in unnormalized form.	LAFS.910.W.4.10,3.7,3.8, 3.9,2.6,2.5,2.4 LAFS.1112.W.4.10,3.7,3. 8,3.9,2.6,2.5,2.4	
28.0	Demonstrate proficiency in the technique of normalization by labeling and organizing all items in a database in such a way as to prevent any confusion or mistakes. – The student will be able to:	LAFS.910.W.4.10,3.7,3.8, 3.9,2.6,2.5,2.4 LAFS.1112.W.4.10,3.7,3. 8,3.9,2.6,2.5,2.4	
	28.01 Differentiate between unnormalized data and normalized.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	28.02 Move data from an unnormalized form through to a third normal form.	LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.7,3.8,3.9 LAFS.910.L.1.1,1.2,3.6 LAFS.1112.L.1.1,1.2,3.6	
	28.03 Demonstrate ability to test data groups for third normal form compliance.	LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.7,3.8,3.9 LAFS.910.L.1.1,1.2,3.6 LAFS.1112.L.1.1,1.2,3.6	
	28.04 Identify optimized data groups from given groups of normalized data.	LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.7,3.8,3.9 LAFS.910.L.1.1,1.2,3.6 LAFS.1112.L.1.1,1.2,3.6	
29.0	Demonstrate proficiency in table normalization by combining the techniques of an entity relationship model or a top-down, business approach to data with normalization or a bottom-up mathematical approach to data. – The student will be able to:	LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.7,3.8,3.9 LAFS.910.L.1.1,1.2,3.6 LAFS.1112.L.1.1,1.2,3.6 MAFS.K12.MP.8.1	
	29.01 Compare the normalization and entity relationship modeling (ERM) techniques in terms of strengths and weaknesses.		
	29.02 Further define normalization and explain its benefits.	LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.7,3.8,3.9 LAFS.910.L.1.1,1.2,3.6 LAFS.1112.L.1.1,1.2,3.6	
	29.03 Place tables in third normal form.	LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.7,3.8,3.9 LAFS.910.L.1.1,1.2,3.6 LAFS.1112.L.1.1,1.2,3.6	
	29.04 Explain how conceptual data modeling rules ensure normalized tables.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
	29.05 Specify referential integrity constraints and design indexes.		
30.0	Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database. – The student will be able to:	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.L.3.6 LAFS.1112.L.3.6	
	30.01 Evaluate the transformation of business requirements into an initial layout and design for a database.		
	30.02 Construct simple web page design for personal work folder.	LAFS.910.SL.1.2,2.4,2.5, 2.6 LAFS.1112.SL.1.2,,2.4, 2.5, 2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.2.6,2.5,2.4, 3.7,3.8,3.9 LAFS.1112.W.2.6,2.5,2.4, 3.7,3.8,3.9	
30.03 Evaluate existing web sites and determine quality of design.	LAFS.910.SL.1.2,2.4,2.5, 2.6 LAFS.1112.SL.1.2,,2.4, 2.5,2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,2.5,2.4, 3.7,3.8,3.9 LAFS.1112.W.2.6,2.5,2.4, 3.7,3.8,3.9	
31.0 Extend the ERM presentation model by normalizing the data and mapping the management system. – The student will be able to:	LAFS.910.SL.1.2,2.4,2.5, 2.6 LAFS.1112.SL.1.2,,2.4, 2.5,2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,2.5,2.4, 3.7,3.8,3.9 LAFS.1112.W.2.6,2.5,2.4, 3.7,3.8,3.9	
31.01 Formulate a plan of action for the Database Project using skills previously learned in this course.		
31.02 Normalize an ERM to the third normal form (3NF).	LAFS.910.SL.1.2,2.4,2.5, 2.6 LAFS.1112.SL.1.2, 2.4 2.5,2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
31.03 Create a table in the database using a database authoring tool.		
31.04 Demonstrate ability to edit tables using a database authoring tool.		
31.05 Create forms that will display the table components created with a database authoring tool.	LAFS.910.SL.1.1,2.4,2.5, LAFS.1112.SL.1.1,2.4, 2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,4.10	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.W.2.6,4.10	
32.0	Apply techniques for building a storage management system by creating a website using templates and wizards. – The student will be able to:	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,4.10 LAFS.1112.W.2.6,4.10	
	32.01 Create a web site that displays the database project home.		
	32.02 Link a web site to create a web-enabled interface to the industry database.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,4.10 LAFS.1112.W.2.6,4.10	
	32.03 Edit the forms created and specify appropriate field labels for data entry.		
33.0	Demonstrate storage closet design and functionality by constructing a group business presentation. – The student will be able to:	LAFS.910.W.2.5,4.10 LAFS.1112.W.2.5,4.10	
	33.01 Evaluate and generate criteria for a formal, business presentation.		
	33.02 Construct a persuasive group presentation using the guidelines set forth in class.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.6,3.8,3.9 LAFS.1112.W.2.6,3.8,3.9	
34.0	Demonstrate comprehension of database modeling competency through group presentation. – The student will be able to:	LAFS.910.SL. 1.1,2.4, 2.5,2.6 LAFS.1112.SL. 1.1,2.4, 2.5,2.6 LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.7,3.8,3.9	
	34.01 Deliver a formal business presentation for the class that discusses an entity-relationship model and initial database design.		
	34.02 Demonstrate the functionality of the database and the layout/design capabilities of a database authoring tool.	LAFS.910.SL.2.4,2.5,2.6, 1.1 LAFS.1112.SL. 1.1,2.4, 2.5,2.6	
	34.03 Self-assess learning experience through the presentation and demonstration of their final database project.	LAFS.910.SL.1.1,2.4,2.5, LAFS.1112.SL.1.1, 2.4, 2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,4.10 LAFS.1112.W.2.6,4.10	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
35.0 Demonstrate language arts knowledge and skills. – The student will be able to:	LAFS.910.SL.1.1,2.4,2.5, LAFS.1112.SL.1.1,2.4, 2.5 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6,4.10 LAFS.1112.W.2.6,4.10	
35.01 Locate, comprehend and evaluate key elements of oral and written information.		
35.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.	LAFS.910.SL.1.2,1.3 LAFS.1112.SL.1.2,1.3 LAFS.910.W.2.4,2.5,2.6, 3.7,3.8,3.9 LAFS.1112.W.2.6,2.4,2.5, 3.8,3.7,3.9	
35.03 Present information formally and informally for specific purposes and audiences.	LAFS.910.L.1.1,1.2 LAFS.1112.L.1.1,1.2 LAFS.910.W. 2.4,2.5, 2.6 LAFS.1112.W. 2.4,2.5, 2.6	
36.0 Demonstrate mathematics knowledge and skills. – The student will be able to:	LAFS.910.SL.2.4,2.5,2.6 LAFS.1112.SL.2.4,2.5,2.6 LAFS.910.W.3.7,3.8,3.9 LAFS.1112.W.3.8,3.7,3.9	
36.01 Demonstrate knowledge of arithmetic operations.		
36.02 Analyze and apply data and measurements to solve problems and interpret documents.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
36.03 Construct charts/tables/graphs using functions and data.	LAFS.910.W.4.10 LAFS.1112.W.4.10 MAFS.912.F-BF.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Data and Control Functions**
Course Number: **8206420**
Course Credit: **.5**

Course Description:

This course introduces data-server technology. Structured Query Language (SQL) is the standardized language that creates a medium for companies to compete in the building of databases or data management systems. Content of this course includes creation and maintenance of database objects and storage, retrieval and manipulation of data using SQL and Programming Language (PL) PL/SQL programming languages. At the completion of Database Fundamentals and Data Control and Functions, students will be able to create blocks of application code that can be shared by multiple forms, reports and data management applications and to sit for the first of two certification exams.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
37.0 Demonstrate comprehension that the database management software is a system for organizing the storage unit (or database) according to business needs and rules, through data integrity constraints. – The student will be able to:		
37.01 Identify the structural elements of a relational database table.	LAFS.910.W.4.10 LAFS,1112.W.4.10 LAFS.910.R.I.4.10 LAFS.112.R.I.4.10 LAFS.910.L.3.6 LAFS.1112.L.3.6	
37.02 List and describe the system development life cycle.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
37.03 Describe the industry implementation of the relational database management system (RDBMS) and object relational database management system (ORDBMS).	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
	37.04 Explain how SQL and languages that extend SQL are used in the industry product set.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
	37.05 Identify the advantages of a database management system.	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.R.I.4.10 LAFS.112.R.I.4.10 LAFS.910.L.3.6 LAFS.112.L.3.6	
38.0	Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements. – The student will be able to:		
	38.01 List the capabilities of SQL SELECT statements.		
	38.02 Execute a basic select statement.		
	38.03 Differentiate between SQL statements and language commands that extend SQL.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.RI.4.10 LAFS.1112.RI.4.10	
39.0	Demonstrate proficiency working with columns, characters, and rows in SQL. – The student will be able to:		
	39.01 Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.		
	39.02 Use column aliases to rename columns in the query result.		
	39.03 Eliminate duplicate rows in the query result.		
	39.04 Display the structure of a table.		
	39.05 Apply SQL syntax to restrict the rows returned from a query.		
	39.06 Demonstrate application of the WHERE clause syntax.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.L.3.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.L.3.6 LAFS.910.W.4.10 LAFS.1112.W.4.10	
	39.07 Construct and produce output using a SQL query containing character strings and date values.		
40.0	Demonstrate proficiency in using SQL comparison operators. – The student will be able to:		
	40.01 Apply the proper comparison operator to return a desired result.		
	40.02 Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result.		
	40.03 Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable.		
	40.04 Explain the use of comparison conditions and NULL.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
41.0	Demonstrate proficiency in using logical comparisons and precedence rules. – The student will be able to:		
	41.01 Evaluate logical comparisons to restrict the rows returned based on two or more conditions.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
	41.02 Apply the rules of precedence to determine the order in which expressions are evaluated and calculated.		
	41.03 Construct a query to order a results set for single or multiple columns.		
	41.04 Construct a query to sort a results set in ascending or descending order.		
42.0	Demonstrate proficiency using SQL single row functions. – The student will be able to:		
	42.01 Perform calculations on data.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
42.02 Modify individual data items.		
42.03 Use character, number and date functions in SELECT statements.		
42.04 Format data and numbers for display purposes.		
42.05 Convert column data types.		
43.0 Demonstrate proficiency displaying data from multiple tables. – The student will be able to:		
43.01 Construct select statements to access data from more than one table using quality and non-equality joins.		
43.02 Use outer joins through viewing data that generally does not meet a join condition.		
43.03 Join a table to itself.		
44.0 Demonstrate proficiency aggregating data using GROUP functions. – The student will be able to:		
44.01 Identify the available group functions and describe their use.	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.R.I.4.10 LAFS.112.R.I.4.10 LAFS.910.L.3.6 LAFS.1112.L.3.6	
44.02 Demonstrate the ability to group data through the use of the GROUP BY clause.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.R.I.4.10 LAFS.112.R.I.4.10	
44.03 Demonstrate the ability to include or exclude grouped rows by using the HAVING clause.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.R.I.4.10 LAFS.112.R.I.4.10	
45.0 Demonstrate proficiency utilizing subqueries. – The student will be able to:		
45.01 Write a query with an embedded subquery.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.R.I.4.10 LAFS.112.R.I.4.10	
45.02 Evaluate and perform a multiple-column subquery.	LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
45.03 Describe and explain the behavior of subqueries when null values are retrieved.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
45.04 Create a subquery in a FROM clause.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.5 LAFS.1112.W.2.5 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.3.9 LAFS.1112.W.3.9 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.1.2 LAFS.1112.SL.1.2	
46.0 Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language. – The student will be able to:		
46.01 Produce queries that require an input variable.		
46.02 Customize the SQL language interface and reporting environment using SET commands for control.		
46.03 Produce more readable output through the use of the column and break commands.		
46.04 Describe data manipulation language (DML) and describe various DML statements.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
	46.05 Utilize data manipulation language (DML) through inserting, updating and deleting rows from a table.		
	46.06 Control transactions using COMMIT and ROLLBACK statements.		
47.0	Demonstrate proficiency creating and managing database objects. – The student will be able to:		
	47.01 Describe the main database objects.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
	47.02 Create tables and alter their definitions.		
	47.03 Describe the data types that can be used when specifying column definition.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910,SL.2.5 LAFS.1112.SL.2.5	
48.0	Demonstrate proficiency altering tables and constraints implementing views. – The student will be able to:		
	48.01 Create, drop, rename and truncate tables using SQL.		
	48.02 Identify and describe various constraints including not null, unique, primary key, foreign key, and check.	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.R.I.4.10 LAFS.112.R.I.4.10 LAFS.910.L.3.6 LAFS.1112.L.3.6	
	48.03 Create and maintain constraints including adding, dropping, enabling, disabling, and cascading.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.5 LAFS.1112.W.2.5 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.W.3.8 LAFS.910.W.3.9 LAFS.1112.W.3.9 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.1.2 LAFS.1112.SL.1.2	
	48.04 Recognize views and explain how they are created, how they retrieve data and how they perform DML operations.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5	
49.0	Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects. – The student will be able to:		
	49.01 Create views, retrieve data through a view, alter the definition of a view and drop a view.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.5 LAFS.1112.W.2.5 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.3.9 LAFS.1112.W.3.9 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.1.2 LAFS.1112.SL.1.2	
	49.02 Categorize information by using Top-N queries to retrieve specified data.		
	49.03 Identify the features of a sequence and display sequence values using a data dictionary view.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1. LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.SL.2.5 LAFS.910.SL.2.6 LAFS.1112.SL.2.6	
49.04 Identify the characteristics of a cached sequence.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5 LAFS.910.SL.2.6 LAFS.1112.SL.2.6	
49.05 Modify and remove a sequence using a SQL statement.		
49.06 Identify the features of private and public synonyms.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5 LAFS.910.SL.2.6 LAFS.1112.SL.2.6	
49.07 Identify characteristics of an index and describe different types.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5 LAFS.910.SL.2.6 LAFS.1112.SL.2.6	
49.08 Create and remove an index using a SQL statement.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
50.0	Demonstrate ability to control user access and SQL language interface and reporting tool. – The student will be able to:		
50.01	Identify the features of database security.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5	
50.02	Create users using SQL statements.		
50.03	Grant and revoke object privileges using a SQL language interface and reporting tool.		
51.0	Demonstrate comprehension of bundling features of SQL. – The student will be able to:		
51.01	List and describe the benefits of extensions to SQL.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5	
51.02	Recognize the basic SQL block and its sections.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5	
51.03	Declare SQL variables and describe their significance.		
51.04	Execute a SQL block.		
52.0	Demonstrate comprehension working with composite data types by writing executable script files. – The student will be able to:		
52.01	Recognize the significance of the executable section and decide when to use it.	LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.6 LAFS.1112.SL.2.6	
52.02 Write statements in the executable section.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.W.4.10 LAFS.1112.W.4.10	
52.03 Describe the rules of nested blocks.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5	
52.04 Identify and utilize appropriate coding conventions.	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.R.I.4.10 LAFS.112.R.I.4.10 LAFS.910.L.3.6 LAFS.1112.L.3.6	
52.05 Create a script that will insert, update, merge and delete data in a table.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.3.9 LAFS.1112.W.3.9 LAFS.910.W.4.10 LAFS.1112.W.4.10	

Florida Department of Education
Student Performance Standards

Course Title: **Specialized Database Programming**
Course Number: **8206430**
Course Credit: **1**

Course Description:

This course covers PL/SQL, a procedural language extension to SQL. Through an innovative project-based approach, students learn procedural logic constructs such as variables, constants, conditional statements, and iterative controls. After completing this course, the student will have the opportunity to sit for the second of two exams required to earn the Oracle Certified Associate certification and the student will be able to:

Florida Standards			Correlation to CTE Program Standard #
37.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database and Programming Essentials.		
37.01	Key Ideas and Details		
	37.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	37.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	37.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
37.02	Craft and Structure		
	37.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	37.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	37.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
37.03	Integration of Knowledge and Ideas		
	37.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	37.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	37.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
37.04	Range of Reading and Level of Text Complexity		
	37.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	37.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
38.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in in Database and Programming Essentials.		
38.01	Text Types and Purposes		
	38.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	38.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
38.02	Production and Distribution of Writing		
	38.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	38.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	38.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	38.03	Research to Build and Present Knowledge	
	38.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	38.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	38.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	38.04	Range of Writing	
	38.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
39.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in in Database and Programming Essentials.	
	39.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	39.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	39.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	39.04	Model with mathematics. MAFS.K12.MP.4.1	
	39.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	39.06	Attend to precision. MAFS.K12.MP.6.1	
	39.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
39.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
53.0 Describe the differences between SQL and PL/SQL. – The student will be able to:		
53.01 Describe PL/SQL.	LAFS.910.SL.1.1 LASF.1112.SL.1.1 LAFS.910.RI.2.4 LAFS.1112.RI.2.4	
53.02 Differentiate between SQL and PL/SQL.	LAFS.910.SL.1.1 LASF.1112.SL.1.1	
53.03 Explain the need for and benefits of PL/SQL.	LAFS.910.SL.1.2 LASF.1112.SL.1.2	
54.0 Create PL/SQL blocks. – The student will be able to:		
54.01 Describe the structure of a PL/SQL block.	LAFS.910.SL.1.1 LASF.1112.SL.1.1	
54.02 Identify the different types of PL/SQL blocks.	LAFS.910.SL.1.1 LASF.1112.SL.1.1	
54.03 Identify PL/SQL programming environments.	LAFS.910.SL.1.1 LASF.1112.SL.1.1 LAFS.910.RI.2.4 LAFS.1112.RI.2.4	
54.04 Create and execute an anonymous block.		
54.05 Output messages in PL/SQL.		
55.0 Use variables in PL/SQL. – The student will be able to:		
55.01 Describe how variables are used in PL/SQL.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
55.02 Identify the syntax for using variables.	LAFS.910.L.1.1 LAFS.1112.L.1.1	
55.03 Declare and initialize variables.	LAFS.910.W.4.10 LAFS.1112.W.4.10	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
55.04 Assign new values to variables.		
56.0 Recognize lexical units. – The student will be able to:		
56.01 Describe the types of lexical units in PL/SQL.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.4.10 LAFS.1112.W.4.10	
56.02 Describe identifiers and identify valid and invalid identifiers.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.4.10 LAFS.1112.W.4.10	
56.03 Describe and identify reserved words, delimiters, literals, and comments.	LAFS.910.RI.2.4 LAFS.1112.RI.2.4	
57.0 Recognize data types. – The student will be able to:		
57.01 Describe the data type categories.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
57.02 Give examples of scalar, composite, and large object (LOB) data types.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
57.03 Identify when an object becomes eligible for garbage collection.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
58.0 Use scalar data types. – The student will be able to:		
58.01 Declare and use scalar data types.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.1.2 LAFS.1112.SL.1.2 MAFS.912.CN.2.5	
58.02 Define guidelines for declaring and initializing variables.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
58.03 Describe the benefits of anchoring data types with the %TYPE attribute.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
59.0 Use various types of joins. – The student will be able to:		
59.01 Construct and execute SELECT statements using an equijoin.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
59.02 Construct and execute SELECT statements using a non-equijoin.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
59.03 Construct and execute SELECT statements using an outer join.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
59.04 Construct and execute SELECT statements that result in a Cartesian product.	LAFS.910.L.2.3 LAFS.1112.L.2.3	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
60.0	Use SQL group functions and subqueries. – The student will be able to:		
60.01	Construct and execute an SQL query using group functions to determine a sum total, an average amount, and a maximum value.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
60.02	Construct and execute an SQL query that groups data based on specified criteria.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
60.03	Construct and execute an SQL query that contains a WHERE clause using a single-row subquery.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
60.04	Construct and execute an SQL query that contains a WHERE clause using a multiple-row subquery.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
61.0	Write PL/SQL executable statements. – The student will be able to:		
61.01	Construct variable assignment statements.	LAFS.910.W.2.6 LAFS.1112.W.2.6 MAFS.912.MP.1.2	
61.02	Construct statements using built-in SQL functions.	LAFS.910.W.2.6 LAFS.1112.W.2.6 MAFS.912.MP.1.2	
61.03	Differentiate between implicit and explicit data type conversions.	LAFS.910.RI.2.4 LAFS.1112.RI.2.4 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
61.04	Describe when implicit data type conversions take place.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.4.10 LAFS.1112.W.4.10	
61.05	List the drawbacks of implicit data type conversions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.4.10 LAFS.1112.W.4.10	
61.06	Construct statements using functions to explicitly convert data types.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
61.07	Construct statements using operators.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
62.0	Use nested blocks and variable scope. – The student will be able to:		
62.01	Understand the scope and visibility of variables.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
62.02	Write nested blocks and qualify variables with labels.	LAFS.910.SL.2.5 LAFS.1112.SL.2.5	
62.03	Describe the scope of an exception.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.4.2	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.W.4.2	
62.04 Describe the effect of exception propagation in nested blocks.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.4.2 LAFS.1112.W.4.2	
63.0 Use good programming practices. – The student will be able to:		
63.01 List examples of good programming practices.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
63.02 Insert comments into PL/SQL code.	LAFS.910.L.1.1,2.6 LAFS.1112.L.1.1,2.6	
63.03 Follow formatting guidelines when writing code.		
64.0 Write DML statements to manipulate data. – The student will be able to:		
64.01 Construct and execute a DML statement to insert data into a table.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
64.02 Construct and execute a DML statement to update data in a table.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
64.03 Construct and execute a DML statement to delete data from a table.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
64.04 Construct and execute a DML statement to merge data into a table.	LAFS.910.L.2.3 LAFS.1112.L.2.3	
65.0 Retrieve data using PL/SQL. – The student will be able to:		
65.01 Identify SQL statements that can be directly included in an executable block.	LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
65.02 Construct and execute an INTO clause to hold values returned by a single-row SELECT statement.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
65.03 Construct statements that retrieve data.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
66.0 Manipulate data using PL/SQL. – The student will be able to:		
66.01 Construct and execute PL/SQL statements that manipulate data with DML statements.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
66.02 Describe when to use implicit or explicit cursors.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
66.03 Create code to use SQL implicit cursor attributes to evaluate cursor activity.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
67.0 Use transaction control statements. – The student will be able to:		
67.01 Define a transaction and give an example.	LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
67.02 Construct and execute a transaction control statement.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
68.0 Use IF conditional control statements. – The student will be able to:		
68.01 Construct and use an IF statement.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
68.02 Construct and use an IF -ELSIF statement.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
68.03 Create PL/SQL to handle null conditions in an IF statement.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
69.0 Use CASE conditional control statements. – The student will be able to:		
69.01 Construct and use CASE statements.		
69.02 Construct and use CASE expressions.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
69.03 Include syntax to handle null conditions in a CASE statement.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
69.04 Include syntax to handle Boolean conditions in IF and CASE statements.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
70.0 Use basic LOOP iterative control statements. – The student will be able to:		
70.01 Describe the types of LOOP statements and their uses.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
70.02 Create PL/SQL containing a basic loop and an EXIT statement.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
70.03 Create PL/SQL containing a basic loop and an EXIT statement with conditional termination.	LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.2.6 LAFS.1112.W.2.6	
71.0 Use WHILE and FOR loop iterative control statements. – The student will be able to:		
71.01 Construct and use the WHILE looping construct.		
71.02 Construct and use the FOR looping construct.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
71.03 Describe when a WHILE loop is used.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
71.04 Describe when a FOR loop is used.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
72.0 Use nested loop iterative control statements. – The student will be able to:		
72.01 Construct and execute PL/SQL using nested loops.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
72.02 Evaluate a nested loop construct and identify the exit point.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
73.0 Use explicit cursors. – The student will be able to:		
73.01 List the guidelines for declaring and controlling explicit cursors.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
73.02 Create PL/SQL code to open a cursor and fetch a piece of data into a variable.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
73.03 Use a simple loop to fetch multiple rows from a cursor.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
73.04 Create PL/SQL code to close a cursor.	LAFS.910.L.3.6 LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.2.6 LAFS.1112.W.2.6	
74.0 Use explicit cursor attributes. – The student will be able to:		
74.01 Define a record structure using the %ROWTYPE attribute.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
74.02 Create PL/SQL code to process the row of an active set using record types in cursors.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
74.03 Use cursor attributes to retrieve information about the state of an explicit cursor.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
75.0 Use cursor FOR loops. – The student will be able to:		
75.01 List and explain the benefits of using cursor FOR loops.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
75.02 Create PL/SQL code to declare a cursor and manipulate it in a FOR loop.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
75.03 Create PL/SQL code containing a cursor FOR loop using a subquery.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
76.0 Use cursors with parameters. – The student will be able to:		
76.01 List the benefits of using parameters with cursors.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
76.02 Create PL/SQL code to declare and manipulate a cursor with a parameter.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 LAFS.1112.W.2.6	
77.0 Use cursors for UPDATE transactions. – The student will be able to:		
77.01 Create PL/SQL code to lock rows before an update using the appropriate clause.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
77.02 Explain the effect of using NOWAIT in an update cursor declaration.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
77.03 Create PL/SQL code to use the current row of the cursor in an UPDATE or DELETE statement.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
78.0 Use multiple cursors. – The student will be able to:		
78.01 Explain the need for using multiple cursors to produce multilevel reports.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
78.02 Create PL/SQL code to declare and manipulate multiple cursors within nested loops.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
78.03 Create PL/SQL code to declare and manipulate multiple cursors using parameters.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
79.0 Handle exceptions. – The student will be able to:		
79.01 Describe the advantages of including exception handling code.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
79.02 Describe the purpose of an EXCEPTION section in a PL/SQL block.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
79.03 Create PL/SQL code to include an EXCEPTION section.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
79.04 List the guidelines for exception handling.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
80.0 Trap Oracle server exceptions. – The student will be able to:		
80.01 Distinguish between errors defined by the Oracle Server and those defined by the programmer.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
80.02 Differentiate between errors that are handled implicitly and explicitly by the Oracle Server.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
80.03 Write PL/SQL code to trap a predefined Oracle Server error.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
80.04 Write PL/SQL code to trap a non-predefined Oracle Server error.	LAFS.910.W.4.10 LAFS.1112.W.4.10	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
80.05 Write PL/SQL code to identify an exception by error code and by error message.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
81.0 Trap user-defined exceptions. – The student will be able to:		
81.01 Write PL/SQL code to name a user-defined exception.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
81.02 Write PL/SQL code to raise an exception.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
81.03 Write PL/SQL code to handle a raised exception.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
81.04 Write PL/SQL code to use RAISE_APPLICATION_ERROR.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
82.0 Create procedures. – The student will be able to:		
82.01 Differentiate between anonymous blocks and subprograms.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
82.02 Identify the benefits of using subprograms.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
82.03 Describe a stored procedure.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
82.04 Create a procedure.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
82.05 Describe how a stored procedure is invoked.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
83.0 Use parameters in procedures. – The student will be able to:		
83.01 Describe how parameters contribute to a procedure.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
83.02 Define a parameter.	LAFS.910.L.3.6 LAFS.1112.L.3.6	
83.03 Create a procedure using a parameter.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.W.4.10 LAFS.1112.W.4.10	
83.04 Invoke a procedure that has parameters.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.W.4.10 LAFS.1112.W.4.10	
83.05 Distinguish between formal and actual parameters.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
84.0 Pass parameters. – The student will be able to:		
84.01 List the types of parameter modes.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
84.02 Create a procedure that passes parameters.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
84.03 Identify three methods for passing parameters.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
84.04 Describe the DEFAULT option for parameters.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
85.0 Create stored functions. – The student will be able to:		
85.01 Describe the difference between a stored procedure and a stored function.		
85.02 Create a PL/SQL block containing a function.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.W.4.10 LAFS.1112.W.4.10	
85.03 Identify ways in which functions may be invoked.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
85.04 Create a PL/SQL block that invokes a function that has parameters.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
86.0 Use functions in SQL statements. – The student will be able to:	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
86.01 Describe where user-defined functions can be called from within an SQL statement.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
86.02 Describe the restrictions on calling functions from SQL statements.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
86.03 Describe the purpose of the Data Dictionary.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
86.04 Differentiate between the three types of Data Dictionary views.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
86.05 Write SQL SELECT statements to retrieve information from the Data Dictionary.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
86.06 Explain the use of DICTIONARY as a Data Dictionary search engine.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
87.0 Manage procedures and functions. – The student will be able to:		
87.01 Describe how exceptions are propagated.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
87.02 Remove a function and a procedure.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
87.03 Use Data Dictionary views to identify and manage stored procedures.		
88.0 Manage object privileges. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
88.01 List and explain several object privileges.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
88.02 Explain the function of the EXECUTE object privilege.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
88.03 Write SQL statements to grant and revoke object privileges.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
89.0 Use invoker's rights. – The student will be able to:		
89.01 Contrast invoker's rights with definer's rights.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
89.02 Create a procedure that uses invoker's rights.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
90.0 Create packages. – The student will be able to:		
90.01 Describe a package, its components, and the reasons for use.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
90.02 Create packages containing related variables, cursors, constants, exceptions, procedures, and functions.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
90.03 Create a PL/SQL block that invokes a package construct.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
91.0 Manage package constructs. – The student will be able to:		
91.01 Explain the difference between public and private package constructs.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.6 LAFS.1112.W.2.6	
91.02 Designate a package construct as either public or private.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
91.03 Specify the syntax to drop a package.	LAFS.910.L.1.1 LAFS.1112.L.1.1	
91.04 Identify Data Dictionary views used to manage packages.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
91.05 Identify the guidelines for using packages.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
92.0 Use advanced package concepts. – The student will be able to:		
92.01 Write packages that use the overloading feature.		
92.02 Write packages that use forward declarations.		
92.03 Explain the purpose of a package initialization block.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
92.04 Identify restrictions on using packaged functions in SQL statements.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
93.0 Manage persistent state of package variables. – The student will be able to:		
93.01 Identify persistent states of package variables.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
93.02 Control the persistent state of a package cursor.		
94.0 Use Oracle-supplied packages. – The student will be able to:		
94.01 Describe two common uses for the DBMS_OUTPUT package.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
94.02 Use the syntax to specify messages for the DBMS_OUTPUT package.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
94.03 Describe the purpose for the UTL_FILE package.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
94.04 Identify the exceptions used in conjunction with the UTL_FILE package.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
95.0 Understand dynamic SQL. – The student will be able to:		
95.01 Identify the stages through which all SQL statements pass.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1, 1.2	
95.02 Describe the reasons for using dynamic SQL to create an SQL statement.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1, 1.2	
95.03 List four PL/SQL statements supporting Native Dynamic SQL.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
95.04 Describe the benefits of Execute Immediate over DBMS_SQL for Dynamic SQL.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
96.0 Understand triggers. – The student will be able to:		
96.01 Describe database triggers and their uses.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
96.02 Differentiate between a database trigger and an application trigger.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
96.03 List the guidelines for using triggers.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
96.04 Compare and contrast database triggers and stored procedures.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
97.0 Create DML triggers. – The student will be able to:		
97.01 Create a DML trigger and identify its components.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
97.02 Create a statement level trigger.	LAFS.910.W.2.6 LAFS.1112.W.2.6	

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97.03 Describe the trigger firing sequence options.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
97.04 Create a DML trigger that uses conditional predicates.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
97.05 Create a row level trigger.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
97.06 Create a row level trigger that uses OLD and NEW qualifiers.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
97.07 Create an INSTEAD OF trigger.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
98.0 Create DDL and database event triggers. – The student will be able to:		
98.01 Describe the events that cause DDL and database event triggers to fire.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
98.02 Create a trigger for a DDL statement.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
98.03 Create a trigger for a database event.		
98.04 Describe the functionality of the CALL statement.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
98.05 Describe the cause of a mutating table.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
99.0 Manage triggers. – The student will be able to:		
99.01 View trigger information in the Data Dictionary.		
99.02 Disable and enable a database trigger.		
99.03 Remove a trigger from the database.		
100.0 Use large object data types. – The student will be able to:		
100.01 Compare and contrast LONG and LOB data types.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
100.02 Describe LOB data types and how they are used.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
100.03 Differentiate between internal and external LOBs.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
100.04 Create and maintain LOB data types.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
100.05 Migrate data from LONG to LOB.		
101.0 Manage BFILEs. – The student will be able to:		

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101.01 Define BFILEs and the BFILE column data type.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
101.02 Create directory objects and view them in the Data Dictionary.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
101.03 Manage and manipulate BFILEs using BFILENAME and DBMS_LOB.		
102.0 Manage indexes. – The student will be able to:		
102.01 Create and manipulate user-defined PL/SQL records.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
102.02 Create an INDEX BY table.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
102.03 Create an INDEX BY table of records.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
102.04 Describe the difference between records, tables, and tables of records.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
103.0 Manage dependencies. – The student will be able to:		
103.01 Describe the implications of procedural dependencies.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
103.02 Contrast dependent objects and referenced objects.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2	
103.03 View dependency information in the Data Dictionary.		
103.04 Use the UTLDTREE script to create the objects required to display dependencies.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
103.05 Use the IDEPTREE and DEPTREE views to display dependencies.	LAFS.910.W.2.6 LAFS.1112.W.2.6	
103.06 Describe when automatic recompilation occurs.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
103.07 Describe how to minimize dependency failures.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
104.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
104.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	
104.02 Locate, organize and reference written information from various sources.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	

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104.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	
104.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	
104.05 Apply active listening skills to obtain and clarify information.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	
104.06 Develop and interpret tables and charts to support written and oral communications.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	
104.07 Exhibit public relations skills that aid in achieving customer satisfaction.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	
105.0 Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
105.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	
105.02 Employ critical thinking and interpersonal skills to resolve conflicts.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	
105.03 Identify and document workplace performance goals and monitor progress toward those goals.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
105.04 Conduct technical research to gather information necessary for decision-making.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	

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106.0 Use information technology tools. – The student will be able to:		
106.01 Use personal information management (PIM) applications to increase workplace efficiency.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
106.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
106.03 Employ computer operations applications to access, create, manage, integrate, and store information.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
106.04 Employ collaborative/groupware applications to facilitate group work.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
107.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
107.01 Describe the nature and types of business organizations.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
107.02 Explain the effect of key organizational systems on performance and quality.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
107.03 List and describe quality control systems and/or practices common to the workplace.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
107.04 Explain the impact of the global economy on business organizations.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
108.0 Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
108.01 Evaluate and justify decisions based on ethical reasoning.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
108.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
108.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
108.04 Interpret and explain written organizational policies and procedures.	LAFS.910.SL.1.1,1.2 LAFS.1112.SL.1.1,1.2 LAFS.910.W.2.6,3.8 LAFS.1112.W.2.6,3.8 LAFS.910.RI.1.2 LAFS.1112.RI.1.2	

Florida Department of Education
Student Performance Standards

Course Title: **Specialized Database Applications**
Course Number: **8206440**
Course Credit: **1**

Course Description:

This is the final course in the Database and Programming Essentials program and is designed to teach specialized database operations and utilization of SQL language for database administration and maintenance.

Florida Standards			Correlation to CTE Program Standard #
37.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database and Programming Essentials.		
	37.01 Key Ideas and Details		
	37.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	37.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	37.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	37.02 Craft and Structure		
	37.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	37.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	37.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
37.03	Integration of Knowledge and Ideas		
	37.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	37.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	37.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
37.04	Range of Reading and Level of Text Complexity		
	37.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	37.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
38.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Database and Programming Essentials.		
38.01	Text Types and Purposes		
	38.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	38.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
38.02	Production and Distribution of Writing		
	38.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	38.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	38.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	38.03	Research to Build and Present Knowledge	
	38.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	38.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	38.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	38.04	Range of Writing	
	38.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
39.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Database Programming Essentials.	
	39.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	39.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	39.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	39.04	Model with mathematics. MAFS.K12.MP.4.1	
	39.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	39.06	Attend to precision. MAFS.K12.MP.6.1	
	39.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
39.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
109.0 Program a database application. – The student will be able to:		
109.01 Utilize loop statements.	MAFS.912.MP.1.1 MAFS.912.MP.4.1	
109.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.	LAFS.912.W.4.10	
109.03 Create user-defined functions.	LAFS.912.W.4.10 LAFS.912.SL.1.1	
109.04 Utilize common built-in functions.	LAFS.912.W.4.10 LAFS.912.SL.1.1	
109.05 Declare variables in modules and procedures.	LAFS.912.W.4.10 LAFS.912.SL.1.1	
109.06 Declare arrays, and initialize elements of arrays.	LAFS.912.W.4.10 LAFS.912.SL.1.1	
109.07 Declare and use object variables and collections, and use their associated properties and methods.	LAFS.912.W.4.10 LAFS.912.SL.1.1	
109.08 Declare symbolic constants, and make them available locally or publicly.	LAFS.912.W.4.10 LAFS.912.SL.1.1	
109.09 Respond to events.		
110.0 Utilize the basic concepts of database design. – The student will be able to:		
110.01 Apply basic concepts of normalization.		
110.02 Utilize the cascade update and cascade delete options.		
111.0 Utilize SQL and UNION queries. – The student will be able to:	LAFS.912.W.4.10	
111.01 Utilize SQL to write common queries.		
111.02 Refer to objects by using SQL.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
111.03 Utilize union queries.		
112.0 Implement program statements using objects. – The student will be able to:		
112.01 Determine when to use data access objects.		
112.02 Differentiate between objects and collections.	LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
112.03 Write statements that access and modify database objects.		
112.04 Utilize data access objects.	MAFS.K12.MP.1.1 MAFS.K12.MP.2.1	
112.05 Select appropriate methods and property settings for use with specified objects.		
113.0 Utilize debugging tools and write error handlers. – The student will be able to:	MAFS.K12.MP.1.1	
113.01 Trap errors.	MAFS.K12.MP.1.1	
113.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.	MAFS.K12.MP.1.1	
113.03 Debug code samples.	MAFS.K12.MP.1.1	
113.04 Utilize the Debugger to monitor variable values.	LAFS.912.W.4.10	
113.05 Write an error handler.		
114.0 Demonstrate file I/O. – The student will be able to:		
114.01 Read from files.		
114.02 Write to files.		
114.03 Utilize record locking.		
115.0 Create forms and identify all the properties of a form. – The student will be able to:	MAFS.K12.MP.1.1	
115.01 Choose form-specific and report-specific properties to set.		
115.02 Choose control properties to set.		
115.03 Assign event-handling procedures to controls in a form.	LAFS.910.W.4.10 LAFS.1112.W.4.10	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
115.04 Define and create form and report modules.	LAFS.910.W.4.10 LAFS.1112.W.4.10	
115.05 Identify the scope of a form or report module.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
115.06 Open multiple instances of a form, and refer to them.		
115.07 Assign values to form properties.		
115.08 Use form methods.		
116.0 Manipulate data using object models. – The student will be able to:		
116.01 Connect to a data source.		
116.02 Open a recordset.	LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.SL.2.6 LAFS.1112.SL.2.6	
116.03 Insert, update, delete and find data.		
117.0 Develop custom controls. – The student will be able to:		
117.01 Set properties for custom controls.		
117.02 Customize user interface controls.		
118.0 Utilize API functions. – The student will be able to:		
118.01 Properly declare functions.	MAFS.912.S-IC.2.4	
118.02 Use the by value and by reference parameters.		
119.0 Demonstrate database replication and implement database replication using programming tools. – The student will be able to:		
119.01 Make a database replicable.		
119.02 View a synchronization schedule.	LAFS.910.W.1.1 LAFS.1112.W.1.1 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
119.03 Explain the purpose of the Replication ID.		
119.04 Explain how synchronization conflicts are resolved.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
119.05 Identify the advantages of using replication of synchronization.	MAFS.K12.MP.1.1	
119.06 Identify the changes that the database engine makes when it converts a nonreplicable database into replicable database.		
120.0 Analyze and implement security options. – The student will be able to:	MAFS.K12.MP.1.1	
120.01 Analyze a scenario, and recommend an appropriate type of security.	LAFS.910.W.1.1 LAFS.1112.W.1.1 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
120.02 Explain the steps for implementing security.	LAFS.910.W.2.4, 2. 5,2.6,3.7,3.8,3.9 LAFS.1112.W.2.4,2 5,2.6,3.7,3.8,3.9 LAFS.910.SL.1.2 1.3,2.4,2.5,2.6 LAFS.1112.SL.1.2 1.3,2.4,2.5,2.6 LAFS.910.L.3.6 LAFS.1112.L.3.6	
120.03 Analyze code to ensure that it sets security options.	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.2.6 4.10 LAFS.1112.W.2.6 4.10	
120.04 Write code to implement security options.		
121.0 Implement client/server applications. – The student will be able to:		
121.01 Demonstrate SQL pass through queries and application queries.		
121.02 Access external data by using ODBC.	MAFS.K12.MP.1.1	
121.03 Trap errors that are generated by the server.	LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.W.4.10 LAFS.1112.W.4.10	
121.04 Optimize connections.		
121.05 Optimize performance for a given client/server application.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
122.0 Optimize the performance of a database. – The student will be able to:		
122.01 Differentiate between single-field and multiple-field indexes.		
122.02 Optimize queries.		
122.03 Restructure queries to allow faster execution.		
122.04 Optimize performance in distributed applications.		
122.05 Optimize performance for client/server applications.		
123.0 Perform application distribution. – The student will be able to:		
123.01 Prepare an application for distribution.		
123.02 Analyze various methods to distribute a client/server application.		
123.03 Distribute custom controls with an application.		
123.04 Provide online help.		
124.0 Test and debug databases. – The student will be able to:		
124.01 Implement error handling.	MAFS.K12.MP.1.1	
124.02 Test and debug library databases.		
125.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.R.I.4.10 LAFS.1112.R.I.4.10	
125.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		
125.02 Explain emergency procedures to follow in response to workplace accidents.	MAFS.K12.MP.1.1	
125.03 Create a disaster and/or emergency response plan.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
126.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.R.I.4.10 LAFS.1112.R.I.4.10 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
126.01 Employ leadership skills to accomplish organizational goals and objectives.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
126.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
126.03 Conduct and participate in meetings to accomplish work tasks.		
126.04 Employ mentoring skills to inspire and teach others.		
127.0 Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:	LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.W.4.10 LAFS.1112.W.4.10 LAFS.910.R.I.4.10 LAFS.1112.R.I.4.10	
127.01 Identify and demonstrate positive work behaviors needed to be employable.		
127.02 Develop personal career plan that includes goals, objectives, and strategies.		
127.03 Examine licensing, certification, and industry credentialing requirements.		
127.04 Maintain a career portfolio to document knowledge, skills, and experience.		
127.05 Evaluate and compare employment opportunities that match career goals.		
127.06 Identify and exhibit traits for retaining employment.		
127.07 Identify opportunities and research requirements for career advancement.		
127.08 Research the benefits of ongoing professional development.		
127.09 Examine and describe entrepreneurship opportunities as a career planning option.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly

indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Business Computer Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8206500
CIP Number	0511020202
Grade Level	9-12, 30, 31
Standard Length	8 credits
Teacher Certification	BUS ED 1 @2 VOE @7 TC COOP ED @7 BUS DP @7 %G TEC ELEC $7 G ELECT DP @7 %G BOOKKEEPIN @4 @7 G COMPU SCI 6
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster. This program offers a broad foundation of knowledge and skills to prepare students for employment in computer programming positions.

The content includes but is not limited to converting problems into detailed plans; writing code into computer language; testing, monitoring, debugging, documenting, and maintaining computer programs; and designing programs for specific uses and machines.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of five occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	8206010 8206020	Business Computer Programming 1 Business Computer Programming 2	1 credit 1 credit	15-1131	2 2	VO
C	8206030 8206040	Business Computer Programming 3 Business Computer Programming 4	1 credit 1 credit	15-1131	2 2	VO
D	8206050 8206060	Business Computer Programming 5 Business Computer Programming 6	1 credit 1 credit	15-1131	3 3	VO
E	8206070	Business Computer Programming 7	1 credit	15-1131	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
8206010	#	#	19/83 23%	#	#	#	#	19/82 23%	#	19/74 26%	#
8206020	19/87 22%	19/80 24%	#	19/69 28%	#	19/70 27%	19/69 28%	#	14/66 21%	#	19/72 27%
8206030	19/87 22%	19/80 24%	#	19/69 28%	#	19/70 27%	19/69 28%	#	14/66 21%	#	19/72 27%
8206040	#	#	#	#	#	#	#	#	#	#	#
8206050	#	#	#	#	#	#	#	#	#	#	#
8206060	#	#	#	#	#	#	#	#	#	#	#

8206070	#	#	#	#	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
8206010	10/67 15%	10/75 13%	10/54 19%	#	#	#	#
8206020	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
8206030	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
8206040	#	#	#	#	#	#	#
8206050	#	#	#	#	#	#	#
8206060	#	#	#	#	#	#	#
8206070	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and

teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Business Computer Programming.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Business Computer Programming.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Business Computer Programming.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal develop, and life goals.
19.0 Participate in work-based learning experiences.
20.0 Identify functions of information processing.
21.0 Identify functions of computers.
22.0 Test programs.
23.0 Plan program design.
24.0 Code programs.
25.0 Perform program maintenance.
26.0 Create and maintain documentation.
27.0 Develop an understanding of basic financial business concepts.
28.0 Demonstrate an understanding of operating systems, environments, and platforms.
29.0 Develop an awareness of software quality assurance.

30.0 Implement enhanced program structures.
31.0 Develop an understanding of programming techniques and concepts.
32.0 Demonstrate language arts knowledge and skills.
33.0 Demonstrate mathematics knowledge and skills.
34.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Business Computer Programming.
35.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Business Computer Programming.
36.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Business Computer Programming.
37.0 Participate in work-based learning experiences.
38.0 Identify functions of information processing.
39.0 Identify functions of computers.
40.0 Test programs.
41.0 Plan program design.
42.0 Code programs.
43.0 Perform program maintenance.
44.0 Create and maintain documentation.
45.0 Evaluate assigned business computer programming tasks.
46.0 Understand the integrated nature of corporate systems.
47.0 Demonstrate an understanding of operating systems, environments, and platforms.
48.0 Implement enhanced program structures.
49.0 Develop an understanding of programming techniques and concepts.
50.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
51.0 Solve problems using critical thinking skills, creativity and innovation.
52.0 Use information technology tools.
53.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
54.0 Describe the importance of professional ethics and legal responsibilities.
55.0 Participate in work-based learning experiences.
56.0 Identify functions of information processing.
57.0 Identify functions of computers.
58.0 Test programs.
59.0 Plan program design.
60.0 Evaluate assigned business computer programming tasks.
61.0 Develop an awareness of software quality assurance.
62.0 Implement enhanced program structures.
63.0 Develop an understanding of programming techniques and concepts.
64.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
65.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
66.0 Explain the importance of employability skill and entrepreneurship skills.
67.0 Participate in work-based learning experiences.

68.0 Identify functions of information processing.
69.0 Code programs.
70.0 Perform program maintenance
71.0 Evaluate assigned business computer programming tasks.
72.0 Implement enhanced program structures.
73.0 Test programs.
74.0 Plan program design.
75.0 Code programs.
76.0 Perform program maintenance.
77.0 Create and maintain documentation.
78.0 Evaluate assigned business computer programming tasks.
79.0 Implement enhanced program structures.
80.0 Test program.
81.0 Perform program maintenance.
82.0 Evaluate assigned business computer programming tasks.
83.0 Demonstrate an understanding of operating systems, environments, and platforms.
84.0 Develop an awareness of software quality assurance.
85.0 Implement enhanced program structures.
86.0 Develop an understanding of programming techniques and concepts.
87.0 Test programs.
88.0 Plan program design.
89.0 Code programs.
90.0 Perform program maintenance.
91.0 Implement enhanced program structures.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Business Computer Programming 1**
Course Number: **8206010**
Course Credit: **1**

Course Description:

This course introduces computer programming concepts for business applications. The content includes basic information processing and computer functions; operating systems, environments, and hardware platforms; programming techniques and concepts; and basic financial business concepts. After successful completion of Business Computer Programming 1 and 2, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Business Computer Programming.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question	

Florida Standards			Correlation to CTE Program Standard #
		the author seeks to address. LAFS.910.RST.2.6	
	01.03	Integration of Knowledge and Ideas	
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
	01.04	Range of Reading and Level of Text Complexity	
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Business Computer Programming.		
	02.01	Text Types and Purposes	
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.02	Production and Distribution of Writing	
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Business Computer Programming.		
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals. – The student will be able to:		
18.01 Investigate specific job opportunities in computer programming in the local job market.		
18.02 Identify tasks performed by computer programming personnel.		
18.03 Identify alternative career paths for computer programmers.		
18.04 Investigate the need for additional training for computer programmers.		
19.0 Participate in work-based learning experiences. – The student will be able to:		
19.01 Participate in work-based learning experiences in a computer programming environment.		
19.02 Discuss the use of technology in a computer programming environment.		
20.0 Identify functions of information processing. – The student will be able to:		
20.01 Identify characteristics of high-level languages.		
20.02 Identify characteristics of operating systems.		
20.03 Identify characteristics of sequential, indexed-sequential, random, and direct files.		
20.04 Identify characteristics of a network.		
20.05 Identify needs for software development in business.		
20.06 Distinguish among integer, fixed-point, and floating-point calculations.		
21.0 Identify functions of computers. – The student will be able to:		
21.01 Identify computer hardware and software.		
21.02 Identify generic data processing terminology.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
21.03 Sequence and define the steps in the input, processing, output, and storage cycle.		
22.0 Test programs. – The student will be able to:		
22.01 Develop a plan for testing programs.		
22.02 Develop data for use in program testing.		
22.03 Perform debugging activities.		
22.04 Distinguish among the different types of program and design errors.		
22.05 Evaluate program test results.		
22.06 Execute programs and subroutines as they relate to the total application.		
22.07 Compile and run programs.		
23.0 Plan program design. – The student will be able to:		
23.01 Formulate a plan to determine program specifications individually and in groups.		
23.02 Use a graphical representation or pseudocode to represent the structure in a program or subroutine.		
23.03 Design programs to solve problems using problem-solving strategies.		
23.04 Prepare proper input/output layout specifications.		
23.05 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.		
24.0 Code programs. – The student will be able to:		
24.01 Utilize reference manuals.		
24.02 Write programs according to the recognized programming standards.		
24.03 Write internal documentation statements as needed in the program source code.		
24.04 Code programs in high-level languages for business applications.		
24.05 Code programs using logical statement (e.g., If-Then-Else, Do...While).		
24.06 Enter and modify source code using a program language editor.		
24.07 Code routines within programs that validate input data.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	24.08 Use the rounding function in calculations within programs.		
25.0	Perform program maintenance. – The student will be able to:		
	25.01 Analyze output to identify and annotate errors or enhancements.		
26.0	Create and maintain documentation. – The student will be able to:		
	26.01 Follow established documentation standards.		
27.0	Develop an understanding of basic financial business concepts. – The student will be able to:		
	27.01 Identify generic accounting terminology as it relates to information systems.		
	27.02 Identify ways in which transactions interact with various business systems.		
28.0	Demonstrate an understanding of operating systems, environments, and platforms. – The student will be able to:		
	28.01 Identify various types of operating systems/environments for different computer hardware platforms.		
	28.02 Distinguish between different types of computer hardware platforms.		
29.0	Develop an awareness of software quality assurance. – The student will be able to:		
	29.01 Identify the legal and social consequences of errors in software.		
	29.02 Describe copyright and other laws that relate to software theft and misuse.		
	29.03 Describe software security measures to protect computer systems and data from unauthorized use and tampering (e.g., physical security, passwords, virus protection/prevention).		
30.0	Implement enhanced program structures. – The student will be able to:		
	30.01 Write programs that incorporate multi-level subtotals and page breaks.		
	30.02 Write programs that include tables or arrays or routines for data entry and lookup.		
	30.03 Write programs that use iteration.		
31.0	Develop an understanding of programming techniques and concepts. – The student will be able to:		
	31.01 Identify the basic constructs used in structured programming.		
	31.02 Distinguish between top-down and bottom-up design.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
31.03 Distinguish between interpreters and compilers.		
32.0 Demonstrate language arts knowledge and skills. – The student will be able to:		
32.01 Locate, comprehend and evaluate key elements of oral and written information.		
32.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
32.03 Present information formally and informally for specific purposes and audiences.		
33.0 Demonstrate mathematics knowledge and skills. – The student will be able to:		
33.01 Demonstrate knowledge of arithmetic operations.		
33.02 Analyze and apply data and measurements to solve problems and interpret documents.		
33.03 Construct charts/tables/graphs using functions and data.		

Florida Department of Education
Student Performance Standards

Course Title: **Business Computer Programming 2**
Course Number: **8206020**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts for business applications. The content includes information processing and computer functions; operating systems; programming techniques and concepts for sequential, indexed sequential, random, and direct files; and the integrated nature of corporate systems. After successful completion of Business Computer Programming 1 and 2, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
34.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Business Computer Programming.		
34.01	Key Ideas and Details		
34.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
34.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
34.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
34.02	Craft and Structure		
34.02.1		Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
34.02.2		Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
34.02.3		Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important	

Florida Standards			Correlation to CTE Program Standard #
		issues that remain unresolved. LAFS.1112.RST.2.6	
	34.03	Integration of Knowledge and Ideas	
	34.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	34.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	34.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
	34.04	Range of Reading and Level of Text Complexity	
	34.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	34.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
35.0		Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Business Computer Programming.	
	35.01	Text Types and Purposes	
	35.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	35.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
	35.02	Production and Distribution of Writing	
	35.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	35.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	

Florida Standards			Correlation to CTE Program Standard #
	35.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
35.03	Research to Build and Present Knowledge		
	35.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	35.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	35.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
35.04	Range of Writing		
	35.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
36.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Business Computer Programming.		
36.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
36.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
36.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
36.04	Model with mathematics. MAFS.K12.MP.4.1		
36.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
36.06	Attend to precision. MAFS.K12.MP.6.1		
36.07	Look for and make use of structure.		

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.7.1	
36.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
37.0 Participate in work-based learning experiences. – The student will be able to:		
37.01 Participate in work-based learning experiences in a computer programming environment.		
37.02 Discuss the use of technology in a computer programming environment.		
37.03 Compare and contrast programming languages used in a computer programming environment.		
38.0 Identify functions of information processing. – The student will be able to:		
38.01 Identify causes of software development problems in business.		
38.02 Identify most appropriate languages for solving business problems.		
38.03 Describe the difference between a database management system and a file management system.		
38.04 Manipulate data between numbering systems.		
38.05 Identify how numeric and non-numeric data are represented in memory.		
39.0 Identify functions of computers. – The student will be able to:		
39.01 Identify advanced data processing terminology.		
39.02 Identify examples of emerging hardware technology.		
39.03 Illustrate various configurations of hardware components.		
40.0 Test programs. – The student will be able to:		
40.01 Use trace routines of compilers to assist in program debugging.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
41.0 Plan program design. – The student will be able to:		
41.01 Examine existing utility programs and subroutines for use with other programs.		
42.0 Code programs. – The student will be able to:		
42.01 Write code that accesses sequential, indexed sequential, random, and direct files.		
43.0 Perform program maintenance. – The student will be able to:		
43.01 Review requested modification of programs and establish a plan of action.		
43.02 Design needed modifications in conformance with established standards.		
43.03 Code, test, and debug modifications prior to updating production code.		
43.04 Update production programs and documentation with changes.		
44.0 Create and maintain documentation. – The student will be able to:		
44.01 Write documentation to assist operators and end-users.		
44.02 Update existing documentation to reflect program changes.		
45.0 Evaluate assigned business computer programming tasks. – The student will be able to:		
45.01 Estimate the time necessary to write a program.		
46.0 Understand the integrated nature of corporate systems. – The student will be able to:		
46.01 Analyze the flow of information throughout the various departments in a business.		
46.02 Explain how programs written for one department affect other departments in the business.		
47.0 Demonstrate an understanding of operating systems, environments, and platforms. – The student will be able to:		
47.01 Assess and analyze the functions of different operating systems.		
48.0 Implement enhanced program structures. – The student will be able to:		
48.01 Write routines to sort arrays.		
48.02 Write programs that sort records in files.		
48.03 Write programs to create and maintain a master file.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	48.04 Write programs to process transactions.		
	48.05 Write programs that read and write sequential files.		
	48.06 Write programs that read and write indexed-sequential files.		
	48.07 Write programs that read and write random files.		
49.0	Develop an understanding of programming techniques and concepts. – The student will be able to:		
	49.01 Distinguish between iteration and recursion.		
	49.02 Evaluate Boolean expressions.		
50.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
	50.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		
	50.02 Locate, organize and reference written information from various sources.		
	50.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.		
	50.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.		
	50.05 Apply active listening skills to obtain and clarify information.		
	50.06 Develop and interpret tables and charts to support written and oral communications.		
	50.07 Exhibit public relations skills that aid in achieving customer satisfaction.		
51.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	51.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.		
	51.02 Employ critical thinking and interpersonal skills to resolve conflicts.		
	51.03 Identify and document workplace performance goals and monitor progress toward those goals.		
	51.04 Conduct technical research to gather information necessary for decision-making.		
52.0	Use information technology tools. – The student will be able to:		
	52.01 Use personal information management (PIM) applications to increase workplace efficiency.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	52.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
	52.03 Employ computer operations applications to access, create, manage, integrate, and store information.		
	52.04 Employ collaborative/groupware applications to facilitate group work.		
53.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
	53.01 Describe the nature and types of business organizations.		
	53.02 Explain the effect of key organizational systems on performance and quality.		
	53.03 List and describe quality control systems and/or practices common to the workplace.		
	53.04 Explain the impact of the global economy on business organizations.		
54.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
	54.01 Evaluate and justify decisions based on ethical reasoning.		
	54.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		
	54.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.		
	54.04 Interpret and explain written organizational policies and procedures.		

Florida Department of Education
Student Performance Standards

Course Title: **Business Computer Programming 3**
Course Number: **8206030**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts for business applications. The content includes interfaces for systems integration, software quality assurance, and advanced programming techniques and concepts. After successful completion of Business Computer Programming 3 and 4, students will have met Occupational Completion Point C, Junior Programmer, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
34.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Business Computer Programming.		
	34.01 Key Ideas and Details		
	34.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	34.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	34.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	34.02 Craft and Structure		
	34.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	34.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	34.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
34.03	Integration of Knowledge and Ideas		
	34.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	34.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	34.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
34.04	Range of Reading and Level of Text Complexity		
	34.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	34.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
35.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Business Computer Programming.		
35.01	Text Types and Purposes		
	35.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	35.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
35.02	Production and Distribution of Writing		
	35.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	35.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	35.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	35.03	Research to Build and Present Knowledge	
	35.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	35.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	35.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	35.04	Range of Writing	
	35.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
36.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Business Computer Programming.	
	36.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	36.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	36.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	36.04	Model with mathematics. MAFS.K12.MP.4.1	
	36.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	36.06	Attend to precision. MAFS.K12.MP.6.1	
	36.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
36.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
55.0 Participate in work-based learning experiences. – The student will be able to:		
55.01 Participate in work-based learning experiences in a computer programming environment.		
55.02 Compare and contrast programming languages used in a computer programming environment.		
56.0 Identify functions of information processing. – The student will be able to:		
56.01 Choose appropriate storage of numeric values to insure precision needed for calculations (e.g., integer, fixed-point, floating-point).		
57.0 Identify functions of computers. – The student will be able to:		
57.01 Identify the advantages and disadvantages of virtual memory.		
58.0 Test programs. – The student will be able to:		
58.01 Develop a plan for system integration testing.		
59.0 Plan program design. – The student will be able to:		
59.01 Plan interface for systems integration.		
60.0 Evaluate assigned business computer programming tasks. – The student will be able to:		
60.01 Analyze computer resources necessary to run a program.		
61.0 Develop an awareness of software quality assurance. – The student will be able to:		
61.01 Evaluate performance, functionality, and validity of various software packages.		
62.0 Implement enhanced program structures. – The student will be able to:		
62.01 Write programs to import/export data from external sources.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
63.0	Develop an understanding of programming techniques and concepts. – The student will be able to:		
63.01	Identify object-oriented concepts and provide examples of objects in an object-oriented language.		
63.02	Describe development methodologies, programming and system languages, database technologies, and data communication.		
64.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
64.01	Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		
64.02	Explain emergency procedures to follow in response to workplace accidents.		
64.03	Create a disaster and/or emergency response plan.		
65.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
65.01	Employ leadership skills to accomplish organizational goals and objectives.		
65.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
65.03	Conduct and participate in meetings to accomplish work tasks.		
65.04	Employ mentoring skills to inspire and teach others.		
66.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
66.01	Identify and demonstrate positive work behaviors needed to be employable.		
66.02	Develop personal career plan that includes goals, objectives, and strategies.		
66.03	Examine licensing, certification, and industry credentialing requirements.		
66.04	Maintain a career portfolio to document knowledge, skills, and experience.		
66.05	Evaluate and compare employment opportunities that match career goals.		
66.06	Identify and exhibit traits for retaining employment.		
66.07	Identify opportunities and research requirements for career advancement.		
66.08	Research the benefits of ongoing professional development.		
66.09	Examine and describe entrepreneurship opportunities as a career planning option.		

Florida Department of Education
Student Performance Standards

Course Title: **Business Computer Programming 4**
Course Number: **8206040**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts for business applications. The content includes client/server environments, interactive programming, and vendor application programming. After successful completion of Business Computer Programming 3 and 4, students will have met Occupational Completion Point C, Junior Programmer, SOC Code 15-1131.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
67.0	Participate in work-based learning experiences. – The student will be able to:		
67.01	Participate in work-based learning experiences in a computer programming environment.		
67.02	Compare and contrast programming languages used in a computer programming environment.		
67.03	Discuss the management/supervisory skills needed in a computer programming environment.		
68.0	Identify functions of information processing. – The student will be able to:		
68.01	Identify the advantages and disadvantages of blocking and buffering when accessing data on tape and disk storage.		
69.0	Code programs. – The student will be able to:		
69.01	Access external files in a client/server environment.		
70.0	Perform program maintenance. – The student will be able to:		
70.01	Modify or create new programs for vendor supplied applications.		
70.02	Use a computer system with current commercial-end application software to solve problems within an organizational environment.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
71.0 Evaluate assigned business computer programming tasks. – The student will be able to:		
71.01 Utilize and apply project and time management tools to control systems development.		
72.0 Implement enhanced program structures. – The student will be able to:		
72.01 Write routines that incorporate “help” text.		
72.02 Write interactive programs.		
72.03 Design screen layouts for use in interactive programs.		

Florida Department of Education
Student Performance Standards

Course Title: **Business Computer Programming 5**
Course Number: **8206050**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts for business applications. The content includes client/server environments, interactive programming, and vendor application programming.

The competencies included in Business Programming 5 and 6 are designed to allow students to learn a second language. They build on the same tools as mastered in a previous language with increasing refinement of skill. Activities utilized must reflect increasingly greater complexity.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
73.0 Test programs. – The student will be able to:		
73.01 Develop a plan for testing programs.		
73.02 Develop data for use in program testing.		
73.03 Perform debugging activities.		
73.04 Distinguish among the different types of program and design errors.		
73.05 Evaluate program test results.		
73.06 Execute programs and subroutines as they relate to the total application.		
73.07 Use trace routines of compilers to assist in program debugging.		
73.08 Compile and run programs.		
74.0 Plan program design. – The student will be able to:		
74.01 Formulate a plan to determine program specifications individually or in groups.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
74.02	Use a graphical representation or pseudocode to represent the structure in a program or subroutine.		
74.03	Design programs to solve problems using problem-solving strategies.		
74.04	Prepare proper input/output layout specifications.		
74.05	Examine existing utility programs and subroutines for use with other programs.		
74.06	Manually trace the execution of programs and verify that programs follow the logic of their design as documented.		
75.0	Code programs. – The student will be able to:		
75.01	Utilize reference manuals.		
75.02	Write programs according to recognized programming standards.		
75.03	Write internal documentation statements as needed in the program source code.		
75.04	Code programs in high-level languages for business applications.		
75.05	Write code that accesses sequential, indexed sequential, random, and direct files.		
75.06	Code programs using logical statements (e.g., If-Then-Else, Do..While).		
75.07	Enter and modify source code using a program language editor.		
75.08	Code routines within programs that validate input data.		
75.09	Use the rounding function in calculations within programs.		
76.0	Perform program maintenance. – The student will be able to:		
76.01	Review requested modification of programs and establish a plan of action.		
76.02	Design needed modifications in conformance with established standards.		
76.03	Code, test, and debug modifications prior to updating production code.		
76.04	Update production programs and documentation with changes.		
76.05	Analyze output to identify and annotate errors or enhancements.		
77.0	Create and maintain documentation. – The student will be able to:		
77.01	Write documentation to assist operators and end-users.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
77.02 Follow established documentation standards.		
77.03 Update existing documentation to reflect program changes.		
78.0 Evaluate assigned business computer programming tasks. – The student will be able to:		
78.01 Utilize and apply project and time management tools to control systems development.		
79.0 Implement enhanced program structures. – The student will be able to:		
79.01 Write programs that incorporate multi-level subtotals and page breaks.		
79.02 Write programs that include tables or arrays and routines for data entry and lookup.		
79.03 Write routines to sort arrays.		
79.04 Write programs that sort records in files.		
79.05 Write programs to create and maintain a master file.		
79.06 Write programs to process transactions.		
79.07 Write programs that use iteration.		
79.08 Write programs that read and write sequential files.		
79.09 Write programs that read and write indexed-sequential files.		
79.10 Write programs that read and write random files.		

Florida Department of Education
Student Performance Standards

Course Title: **Business Computer Programming 6**
Course Number: **8206060**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts for business applications. The content includes client/server environments, interactive programming, and vendor application programming.

The competencies included in Business Programming 5 and 6 are designed to allow students to learn a second language. They build on the same tools as mastered in a previous language with increasing refinement of skill. Activities utilized must reflect increasingly greater complexity.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
80.0	Test programs. – The student will be able to:		
80.01	Develop a plan for system integration testing.		
81.0	Perform program maintenance. – The student will be able to:		
81.01	Modify or create new programs for vendor supplied applications.		
81.02	Use a computer system with current commercial-end application software to solve problems within an organizational environment.		
82.0	Evaluate assigned business computer programming tasks. – The student will be able to:		
82.01	Utilize and apply project and time management tools to control systems development.		
82.02	Analyze computer resources necessary to run a program.		
83.0	Demonstrate an understanding of operating systems, environments, and platforms. – The student will be able to:		
83.01	Assess and analyze the functions of different operating systems.		
83.02	Assess and analyze the program development and execution utilities of relevant		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	operating systems.		
84.0	Develop an awareness of software quality assurance. – The student will be able to:		
84.01	Evaluate performance, functionality, and validity of various software packages.		
85.0	Implement enhanced program structures. – The student will be able to:		
85.01	Write programs to import/export/convert data from external sources.		
85.02	Write routines that incorporate “help” text.		
85.03	Write interactive programs.		
85.04	Design screen layouts for use in interactive programs.		
85.05	Write programs using object-oriented languages.		
86.0	Develop an understanding of programming techniques and concepts. – The student will be able to:		
86.01	Describe development methodologies, programming and system languages, database technologies, and data communication.		

Florida Department of Education
Student Performance Standards

Course Title: **Business Computer Programming 7**
Course Number: **8206070**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts for business applications. The content includes client/server environments, interactive programming, and vendor application programming.

The competencies included in Business Programming 7 are designed to allow students to master a second language. They build on the same tools as mastered in a previous language with increasing refinement of skill. Activities utilized must reflect increasingly greater complexity.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
87.0 Test programs. – The student will be able to:		
87.01 Develop a plan for testing programs.		
87.02 Develop a plan for system integration testing.		
87.03 Develop data for use in program testing.		
87.04 Perform debugging activities.		
87.05 Distinguish among the different types of program and design errors.		
87.06 Evaluate program test results.		
87.07 Execute programs and subroutines as they relate to the total application.		
87.08 Use trace routines of compilers to assist in program debugging.		
87.09 Compile and run programs.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
88.0	Plan program design. – The student will be able to:		
88.01	Formulate a plan to determine program specifications individually or in groups.		
88.02	Use a graphical representation or pseudocode to represent the structure in a program or subroutine.		
88.03	Design programs to solve problems using problem-solving strategies.		
88.04	Prepare proper input/output layout specifications.		
88.05	Examine existing utility programs and subroutines for use with other programs.		
88.06	Manually trace the execution of programs and verify that programs follow the logic of their design as documented.		
89.0	Code programs. – The student will be able to:		
89.01	Utilize reference manuals.		
89.02	Write programs according to recognized programming standards.		
89.03	Write internal documentation statements as needed in the program source code.		
89.04	Code programs in high-level languages for business applications.		
89.05	Write code that accesses sequential, indexed sequential, random, and direct files.		
89.06	Code programs using logical statements (e.g., If-Then-Else, Do..While).		
89.07	Enter and modify source code using a program language editor.		
89.08	Code routines within programs that validate input data.		
89.09	Use the rounding function in calculations within programs.		
90.0	Perform program maintenance. – The student will be able to:		
90.01	Review requested modification of programs and establish a plan of action.		
90.02	Design needed modifications in conformance with established standards.		
90.03	Code, test, and debug modifications prior to updating production code.		
90.04	Update production programs and documentation with changes.		
90.05	Analyze output to identify and annotate errors or enhancements.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
91.0 Implement enhanced program structures. – The student will be able to:		
91.01 Write programs that include tables or arrays and routines for data entry and lookup.		
91.02 Write programs that use iteration.		
91.03 Write routines that incorporate “help” text.		
91.04 Write programs that read and write sequential files.		
91.05 Write programs that read and write indexed-sequential files.		
91.06 Write programs that read and write random files.		
91.07 Write interactive programs.		
91.08 Design screen layouts for use in interactive programs.		
91.09 Write programs using object-oriented languages.		
91.10 Write programs that include data structures (e.g., stacks, queues, trees, linked lists).		
91.11 Write programs that are event-driven.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Systems Administration**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8207440
CIP Number	0511090105
Grade Level	9-12, 30, 31
Standard Length	7 credits
Teacher Certification	BUS ED 1 @2 VOE @7 TC COOP ED @7 BUS DP @7 %G ELECT DP @7 %G BOOKKEEPIN @4 7 G CLERICAL @7 G SECRETAR 7G TEC ELEC $7 COMPU SCI 6 COMP SVC 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1142 – Network and Computer Systems Administrators 15-1143 – Telecommunications Engineering Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Computer Support Assistant, Network Support Technician, Systems Administrator, Systems Engineer, Wireless Network Administrator, and Data Communications Analyst in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of Digital Information Technology and six additional occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	8207020	Networking 1	1 credit	15-1151	2	VO
C	8207441	Networking 2, Administration	1 credit	15-1142	3	VO
D	8207442	Networking 3, Administration	1 credit	15-1142	3	VO
E	8207443	Networking 4, Administration	1 credit	15-1143	3	VO
F	8207060	Networking 5	1 credit	15-1143	3	VO
G	8207070	Networking 6	1 credit	15-1143	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1	Environmental Science
8207310	15/87 17%	22/80 28%	14/83 17%	20/69 29%	12/67 18%	15/69 22%	12/82 15%	23/66 35%	16/74 22%	18/72 25%	23/70 33%
8207020	3/87 3%	3/80 4%	2/83 2%	3/69 4%	2/67 3%	3/69 4%	2/82 2%	3/66 5%	2/74 3%	3/72 4%	2/70 3%
8207441	21/87 24%	21/80 26%	2/83 2%	21/69 30%	2/67 3%	21/69 30%	16/82 24%	#	2/74 3%	20/72 28%	20/70 29%
8207442	23/87 16%	24/80 30%	5/83 6%	24/69 35%	5/67 7%	23/69 33%	5/82 6%	19/66 29%	5/74 7%	24/72 33%	23/70 33%
8206443	2/87 2%	2/80 3%	2/83 2%	2/69 3%	2/67 3%	2/69 3%	2/82 2%	2/66 3%	2/74 3%	1/72 1%	#
8207060	0/87 0%	2/80 3%	1/83 1%	1/69 1%	2/67 3%	0/69 0%	2/82 2%	#	2/74 3%	1/72 1%	#
8207070	1/87 1%	1/80 1%	1/83 1%	1/69 1%	1/67 1%	1/69 1%	1/82 1%	1/66 2%	1/74 1%	0/72 0%	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	#
8207020	22/67 33%	25/75 33%	18/54 33%	11/46 24%	11/45 24%	12/45 27%	12/45 12%
8207441	10/67 15%	15/75 20%	9/54 17%	3/46 7%	3/45 7%	3/45 7%	3/45 7%
8207442	10/67 15%	16/75 21%	9/54 17%	#	#	5/45 11%	5/45 11%
8206443	2/67 3%	1/75 1%	1/54 2%	3/46 7%	3/45 7%	3/45 7%	3/45 7%
8207060	1/67 1%	1/75 1%	1/54 2%	#	#	#	#
8207070	2/67 3%	1/75 1%	1/54 2%	2/46 4%	2/45 4%	2/45 4%	2/45 4%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Network Systems Administration.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Network Systems Administration.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Network Systems Administration.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
19.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules.
20.0 Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment.
21.0 Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
22.0 Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems.
23.0 Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems.

24.0 Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked.
25.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, email, remote access, or direct contact.
26.0 Demonstrate proficiency using graphical user interface (GUI) operating systems.
27.0 Demonstrate language arts knowledge and skills.
28.0 Demonstrate mathematics knowledge and skills.
29.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Network Systems Administration.
30.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Network Systems Administration.
31.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Network Systems Administration.
32.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
33.0 Participate in work-based learning experiences.
34.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, email, remote access, or direct contact.
35.0 Perform installation and configuration activities.
36.0 Demonstrate proficiency using computer networks.
37.0 Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers.
38.0 Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability.
39.0 Demonstrate proficiency in managing, configuring and troubleshooting storage use.
40.0 Demonstrate proficiency in configuring and troubleshooting network connections.
41.0 Demonstrate proficiency in implementing, monitoring, and troubleshooting security.
42.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
43.0 Solve problems using critical thinking skills, creativity and innovation.
44.0 Use information technology tools.
45.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
46.0 Describe the importance of professional ethics and legal responsibilities.
47.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
48.0 Participate in work-based learning experiences.
49.0 Administer accounts and resources on computers running server operating system software in a networked environment.
50.0 Modify user and computer accounts on computers running a server operating system in a networked environment.
51.0 Perform various administrative functions using groups.
52.0 Enable resource access with permissions, manage access to files and folders using permissions, and manage permission inheritance.
53.0 Implement printing in a networked environment utilizing a particular server operating system.
54.0 Set up a network-wide printing strategy to meet the needs of users and troubleshoot installation or configuration problems.
55.0 Utilize available permissions for managing access to global directory objects, how to move objects between organizational units in the same domain, and how to delegate control of an organizational unit.
56.0 Use group policy to configure folder redirection, browser connectivity, and the desktop.
57.0 Manage computer security in a networking environment.

58.0 Administer servers remotely.
59.0 Monitor server performance by using performance tools, configure and manage performance logs, configure and manage alerts, and manage system monitor views.
60.0 Collect performance data by monitoring primary server subsystems and identify system bottlenecks by using the performance monitoring software.
61.0 Maintaining device drivers.
62.0 Use software tools to manage and set up disks.
63.0 Use file encryption for security of data.
64.0 Plan for a computer disaster and use the features of a server operating system to prevent a disaster or recover when one occurs.
65.0 Manage and distribute critical software updates that resolve known security vulnerabilities and other stability issues.
66.0 Construct and assign IP addresses and isolate addressing issues associated with the IP routing process.
67.0 Configure an internet protocol (IP) address for client computers.
68.0 Configure name resolution mechanisms for clients on a network and describe the name resolution process.
69.0 Isolate common connectivity issues and describe how to use utilities and tools as part of this process.
70.0 Configure a routing solution for a network environment.
71.0 Allocate IP addressing in a network environment.
72.0 Manage the DHCP service to reflect changing client IP addressing needs and monitor DHCP server performance.
73.0 Assign computer names to the IP addresses of the source and destination hosts, and then use the computer name to contact the hosts.
74.0 Resolve host names by using domain name system.
75.0 Manage and monitor DNS servers to ensure that they are functioning properly and to optimize network performance.
76.0 Configure a server with the routing and remote access service, create appropriate remote access connections on a network access server, and configure users' access rights.
77.0 Manage and monitor network access and the network access services.
78.0 Perform installation of a network client operating system.
79.0 Install and configure hardware devices.
80.0 Configure and manage file systems.
81.0 Troubleshoot the boot process and other system issues.
82.0 Configure the desktop.
83.0 Configure IP addresses and name resolution.
84.0 Configure the client to work in a network environment.
85.0 Support remote users.
86.0 Configure a client OS for mobile computing.
87.0 Monitor resources and performance.
88.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
89.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
90.0 Explain the importance of employability skill and entrepreneurship skills.
91.0 Apply communication skills (reading, writing, speaking, listening, and viewing) in a courteous, concise, and correct manner on personal and professional levels.
92.0 Participate in work-based learning experiences.
93.0 Plan a network infrastructure.
94.0 Plan and optimize a TCP/IP physical and logical network.

95.0 Plan and troubleshoot routing.
96.0 Plan a DHCP strategy.
97.0 Plan a DNS strategy.
98.0 Optimize and troubleshoot DNS.
99.0 Plan and troubleshoot IPSEC.
100.0 Plan a network access.
101.0 Troubleshoot network access.
102.0 Analyze global director infrastructure.
103.0 Implement a global directory structure and domain.
104.0 Implement an organizational unit structure.
105.0 Implement user, group, and computer accounts.
106.0 Implement group policy.
107.0 Deploy and manage software by using group policies.
108.0 Implement sites to manage global directory replication.
109.0 Implement placement of domain controllers.
110.0 Use a framework for designing security and create a security design team.
111.0 Recognize and predict common threats by using a threat model.
112.0 Apply a framework for planning risk management.
113.0 Design security for physical resources.
114.0 Design security for computers.
115.0 Design security for accounts.
116.0 Design security for authentication.
117.0 Design security for data.
118.0 Design security for data transmission.
119.0 Design security for network perimeter.
120.0 Design an audit policy and an incident response procedure.
121.0 Participate in work-based learning experiences.
122.0 Demonstrate proficiency in applying radio frequency (RF) technologies.
123.0 Develop an awareness of wireless LAN technologies.
124.0 Perform implementation and management activities.
125.0 Develop an awareness of wireless security systems.
126.0 Demonstrate knowledge of wireless industry standards.
127.0 Participate in work-based learning experiences.
128.0 Demonstrate knowledge of general security concepts.
129.0 Develop an awareness of communication security concepts.
130.0 Develop an awareness of network infrastructure security.
131.0 Develop an awareness of cryptography and its relation to security.
132.0 Incorporate organizational and operational security in an appropriate and effective manner.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Networking 1**
Course Number: **8207020**
Course Credit: **1**

Course Description:

This course is designed to develop competencies needed for employment in network support positions. The content includes instruction in basic hardware configuration, hardware and software troubleshooting, operating systems, and computer networking.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Network Systems Administration.		
01.01	Key Ideas and Details		
01.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
01.02.1		Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2		Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3		Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Network Systems Administration.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly	

Florida Standards			Correlation to CTE Program Standard #
		and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Network Systems Administration.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	
	03.08	Look for and express regularity in repeated reasoning.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:	LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112, SL.1.3	
18.01 Develop strategies for resolving customer conflicts.		
19.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
19.01 Identify and describe the functions of main processing boards (e.g., CPUs, RAM, ROM, bus architecture).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
19.02 Identify and describe the functions of communication ports (e.g., serial and parallel ports).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
19.03 Identify and describe the functions of peripheral devices (e.g., scanners, modems, hard drives, printers.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
19.04 Identify and describe the components of portable systems (e.g., battery, LCD, AC adapter, PDAs).		
19.05 Troubleshoot, install and upgrade computers and peripherals.		
19.06 Perform system hardware setup.		
19.07 Demonstrate an understanding of input/output devices.		
19.08 Install and configure applications software, hardware, and device drivers.		
19.09 Demonstrate an understanding of the operation and purpose of hardware components.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.10	Install operating system software.		
19.11	Customize operating systems.		
19.12	Install application software.		
19.13	Perform storage formatting and preparation activities.	MAFS.912.N-Q.1.1, MAFS.912.N-Q.1.2	
19.14	Identify data measurement (e.g., bits, bytes, kilobytes).	MAFS.912.N-Q.1.1, MAFS.912.N-Q.1.2	SC.912.N.1.1.6
19.15	Install and Configure RAID.		
19.16	Recognize and report on server room environmental issues (temperature, humidity/ESD/power surges, back-up).		
20.0	Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment. – The student will be able to:		
20.01	Troubleshoot a personal computer system		
20.02	Identify configuration problems.		
20.03	Identify software problems.		
20.04	Identify hardware malfunctions.		
20.05	Identify network malfunctions		
20.06	Resolve computer error messages.		
20.07	Understand and troubleshoot memory and cache systems.		
20.08	Verify that drives are the appropriate type.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112.2.1.2	
20.09	Describe knowledge database search procedures used to identify possible solutions when troubleshooting software and hardware problems.		
21.0	Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace. – The student will be able to:		
21.01	Apply basic rules for hardware safety.		SC912.N.1.1.6
21.02	Demonstrate proficiency in basic preventative hardware maintenance.		
21.03	Special disposal procedures that comply with environmental guidelines for batteries, CRTs, toner kits/cartridges, chemical solvents and cans, and MSDS.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	21.04 Apply ergonomic principles applicable to the configuration of computer workstations.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.1, LAFS.1112.W.1.1 LAFS.910.W.1.2, LAFS.1112.W.1.2	
	21.05 Describe ethical issues and problems associated with computers and information systems.		
22.0	Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems. – The student will be able to:		
	22.01 Identify EDO RAM, DRAM, SRAM, RIMM, VRAM, SDRAM, and WRAM.		
	22.02 Identify memory banks, memory chips (8-bit, 16-bit, and 32-bit), SIMMS (Single In-line Memory Module), DIMMS (Dual In-line Memory Module), parity chips versus non-parity chips.		
	22.03 Identify printer parallel port, COM/serial port, floppy drive, hard drive, Memory, and Boot sequence.		
23.0	Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems. – The student will be able to:		
	23.01 Identify types of printers—Laser, Inkjet, Dot Matrix.		
	23.02 Identify care and service techniques and common problems with primary printer types.		
	23.03 Implement and manage printing on a network.		
24.0	Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked. – The student will be able to:	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	24.01 Define networking and describe the purpose of a network.		
	24.02 Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112.W.1.2	
	24.03 Describe the various types of network topologies.		
	24.04 Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
24.05	Configure network and verify network connectivity.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
24.06	Discuss the responsibilities of the network administrator (e.g., rights and responsibilities).		
24.07	Develop user logon procedures.		
24.08	Utilize network management infrastructures (e.g., network monitoring, alerting, security) to perform administrative tasks.		
24.09	Identify common backup strategies and procedures.		
24.10	Select and use appropriate electronic communications software and hardware for specific tasks.		
24.11	Compare and contrast Internet software and protocols.		
24.12	Diagnose and resolve electronic communications operational problems.		
24.13	Design and implement directory tree structures.		
24.14	Install services tools (SNMP, backup software).		
24.15	Perform full backup and verify backup.		
24.16	Identify bottlenecks (e.g., processor, bus transfer, I/O, disk I/O, network I/O, memory).		
24.17	Use the concepts of fault tolerance/fault recovery to create a disaster recovery plan.	LAFS. 910.W.1.2, LAFS.1112.W.1.2	
24.18	Document and test disaster recovery plan regularly, and update as needed.		
25.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, email, internet, remote access, or direct contact. – The student will be able to:	LAFS.910.SL.2.4, LAFS.1112.SL.2.4 LAFS.910.SL.2.6, LAFS.1112.SL.2.6	
25.01	Apply call center vocabulary.		
25.02	Listen and input information simultaneously.		
25.03	Apply first response assistance for minor repair work.		
26.0	Demonstrate proficiency using graphical user interface (GUI) operating systems. – The student will be able to:		
26.01	Identify parts of GUI windows.		
26.02	Create and use icons.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
26.03 Demonstrate proficiency in using menu systems.		
26.04 Demonstrate proficiency in using pointing and selection devices.		
26.05 Identify keyboard shortcuts and special function keys.		
26.06 Demonstrate proficiency in manipulating windows.		
26.07 Utilize help systems and hypertext links.		
26.08 Create, organize, and maintain file system directories.		
26.09 Organize desktop objects.		
26.10 Run multiple applications.		
27.0 Demonstrate language arts knowledge and skills. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.SL.1.3, LAFS.1112.SL.1.3 LAFS.910.RI.3.7, LAFS.1112.RI.3.7 LAFS.910.RI.3.8, LAFS.1112.RI.3.8	
27.01 Locate, comprehend and evaluate key elements of oral and written information.	LAFS.910.W.2.5, LAFS.1112.W.2.5	
27.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.	LAFS.910.SL.2.4, LAFS.1112.SL.2.4 LAFS.910.SL.2.5, LAFS.1112.SL.2.5 LAFS.910.SL.2.6, LAFS.1112.SL.2.6	
27.03 Present information formally and informally for specific purposes and audiences.		
28.0 Demonstrate mathematics knowledge and skills. – The student will be able to:		
28.01 Demonstrate knowledge of arithmetic operations.	MAFS.912.N-Q.1.1, MAFS.912.N-Q.1.2	SC912.N.1.1.6
28.02 Analyze and apply data and measurements to solve problems and interpret documents.	MAFS.912.F-IF.2.4	SC912.N.1.1.6
28.03 Construct charts/tables/graphs using functions and data.	MAFS.912.F-IF.3.9	SC912.N.1.1.6

Florida Department of Education
Student Performance Standards

Course Title: **Networking 2, Administration**
Course Number: **8207441**
Course Credit: **1**

Course Description:

This course is designed to provide individuals with the knowledge necessary to understand and identify the tasks involved in supporting operating system within a large networking environment.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Network Systems Administration.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Networking Systems Administration.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Networking Systems Administration.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:		
32.01 Develop diplomatic methods to communicate with customers.	LAFS.910.SL.1.1, LAFS.910.SL.1.1	
33.0 Participate in work-based learning experiences. – The student will be able to:		
33.01 Participate in work-based learning experiences in a network support services environment.		
33.02 Discuss the use of technology in a network environment.		
34.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, email, remote access, or direct contact. – The student will be able to:		
34.01 Apply first response assistance for minor repair work.		
35.0 Perform installation and configuration activities. – The student will be able to:		
35.01 Configure the operating system environment.		
35.02 Connect client workstation running similar operating system to the network.		
35.03 Configure Internet access for a network.		
35.04 Configure a Web server.	LFAS910.SL.1.1, LFAS1112.SL.1.1	
35.05 Use remote server to deploy operating system.	LFAS910.SL.1.1, LFAS1112.SL.1.1 MAFS.912.A-SSE.1.1	
35.06 Troubleshoot failed installations.	LFAS910.SL.1.1, LFAS1112.SL.1.1 MAFS.912.A-REI.2.3	
35.07 Install and configure network services for interoperability.	LFAS910.SL.1.1, LFAS1112.SL.1.1	
35.08 Monitor, configure troubleshoot and control access to printers.		SC.912.N.1.1.6

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	35.09 Monitor, configure troubleshoot and control access to files, folders, and shared folders.		
	35.10 Monitor, configure troubleshoot and control access to Web sites.		
36.0	Demonstrate proficiency using computer networks. – The student will be able to:		
	36.01 Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.		
37.0	Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers. – The student will be able to:		
	37.01 Configure hardware devices.		
	37.02 Configure driver signing options.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	37.03 Update device drivers.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	37.04 Troubleshoot problems with hardware.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112.W.1.2	
38.0	Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability. – The student will be able to:		
	38.01 Monitor and optimize usage of system resources.	LAFS.910.SL.1.1, LAFS.1112.1.1	
	38.02 Manage processes.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	38.03 Optimize disk performance.	LAFS 910.SL.1.1, LAFS 1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	38.04 Manage and optimize availability of system data and user data.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	SC912.N.1.1.6
	38.05 Recover systems and user data.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
39.0 Demonstrate proficiency in managing, configuring and troubleshooting storage use. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
39.01 Configure and manage user profiles.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
39.02 Monitor, configure and troubleshoot disks and volumes.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
39.03 Configure data compression.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
39.04 Monitor and configure disk quotas.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
39.05 Recover from disk failures.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
40.0 Demonstrate proficiency in configuring and troubleshooting network connections. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
40.01 Install, configure and troubleshoot shared access.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
40.02 Install, configure and troubleshoot a virtual private network.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
40.03 Install, configure and troubleshoot network protocols.		
40.04 Install and configure network services.		
40.05 Configure, monitor and troubleshoot remote access.	LAFS.910.L.3.6, LAFS.1112.L.3.6 MAFS.912-F-BF.2.5	
40.06 Install, configure, monitor, and troubleshoot Terminal Services.	LAFS.910.L.3.6, LAFS.1112.L.3.6 MAFS.912-F-BF.2.5	
40.07 Configure the properties of a connection.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
40.08 Install, configure, and troubleshoot network adapters and drivers.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
41.0	Demonstrate proficiency in implementing, monitoring, and troubleshooting security. – The student will be able to:		
41.01	Encrypt data on a hard disk by using Encrypting File System.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
41.02	Implement, configure, manage and troubleshoot policies in an operating system environment.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
41.03	Implement, configure, manage and troubleshoot auditing.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
41.04	Implement, configure, manage and troubleshoot local accounts.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
41.05	Implement, configure, manage and troubleshoot account policy.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
41.06	Implement, configure, manage and troubleshoot security by using the Security Configuration Tool Set.		
42.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
42.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		
42.02	Locate, organize and reference written information from various sources.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
42.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
42.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	42.05 Apply active listening skills to obtain and clarify information.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	42.06 Develop and interpret tables and charts to support written and oral communications.		
	42.07 Exhibit public relations skills that aid in achieving customer satisfaction.		
43.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	43.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	43.02 Employ critical thinking and interpersonal skills to resolve conflicts.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	43.03 Identify and document workplace performance goals and monitor progress toward those goals.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	43.04 Conduct technical research to gather information necessary for decision-making.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
44.0	Use information technology tools. – The student will be able to:		
	44.01 Use personal information management (PIM) applications to increase workplace efficiency.		
	44.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	44.03 Employ computer operations applications to access, create, manage, integrate, and store information.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	44.04 Employ collaborative/groupware applications to facilitate group work.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
45.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
	45.01 Describe the nature and types of business organizations.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	45.02 Explain the effect of key organizational systems on performance and quality.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2,	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112,W.1.2	
	45.03 List and describe quality control systems and/or practices common to the workplace.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	45.04 Explain the impact of the global economy on business organizations.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
46.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	46.01 Evaluate and justify decisions based on ethical reasoning.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	46.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		
	46.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	46.04 Interpret and explain written organizational policies and procedures.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Networking 3, Administration**
Course Number: **8207442**
Course Credit: **1**

Course Description:

This course continues the study of network support services. The content includes the planning, implementation, and management of server and client operating systems in a networking environment.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Network Systems Administration.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Networking Systems Administration.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Networking Systems Administration.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
47.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:		
47.01	Develop diplomatic methods to communicate with customers, clients, and end-users of information technology services.		
48.0	Participate in work-based learning experiences. – The student will be able to:		
48.01	Participate in work-based learning experiences in a network support services environment.		
48.02	Discuss the use of technology in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
48.03	Discuss the management/supervisors skills needed in a network support services environment.		
49.0	Administer accounts and resources on computers running server operating system software in a networked environment. – The student will be able to:		
49.01	Describe features of server operating system.		
49.02	Log on to the server operating system.		
49.03	Install and configure administrative tools.		
49.04	Create user accounts.		
49.05	Create computer accounts.		
49.06	Create an organizational unit.		
50.0	Modify user and computer accounts on computers running a server operating system in a networked environment. – The student will be able to:		
50.01	Modify user and computer account properties.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
50.02 Enable and unlock user and computer accounts.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
50.03 Create a user account template.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
50.04 Locate user and computer accounts in a global directory structure.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
50.05 Save queries.		
50.06 Reset user and computer accounts.		
50.07 Move domain objects.		
51.0 Perform various administrative functions using groups. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
51.01 Create groups.	MAFS.912.N-Q-1.1	
51.02 Manage group membership.		
51.03 Apply strategies for using groups.		
51.04 Modify groups.		
51.05 Manage default groups.		
52.0 Enable resource access with permissions, manage access to files and folders using permissions, and manage permission inheritance. – The student will be able to:		
52.01 Manage access to resources.		
52.02 Manage access to shared folders.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
52.03 Manage access to files and folders by using file system permissions.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
52.04 Determine effective permissions.		
52.05 Manage access to shared files by using offline caching.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.W.1.2, LAFS.1112,W.1.2	
53.0	Implement printing in a networked environment utilizing a particular server operating system. – The student will be able to:		
	53.01 Install and share printers.		
	53.02 Manage access to printers by using shared printer permissions.		SC.912.N.1.6-10
	53.03 Manage printer drivers.		
	53.04 Implement printer locations.		
54.0	Set up a network-wide printing strategy to meet the needs of users and troubleshoot installation or configuration problems. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	54.01 Change the location of the print spooler.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	54.02 Set printing priorities.		
	54.03 Schedule printer availability.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	54.04 Configure a printing tool.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
55.0	Utilize available permissions for managing access to global directory objects, how to move objects between organizational units in the same domain, and how to delegate control of an organizational unit. – The student will be able to:		
	55.01 Identify the role of organizational units.		
	55.02 Modify permissions for global directory objects.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	55.03 Delegate control of organizational units.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
56.0	Use group policy to configure folder redirection, browser connectivity, and the desktop. – The student will be able to:		
	56.01 Configure group policy settings.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.W.1.2, LAFS.1112,W.1.2	
	56.02 Assign scripts with group policy.		
	56.03 Configure folder redirection.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	SC.912.N.1.1.6
57.0	Manage computer security in a security in a networking environment. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	SC.912.N.1.1.6
	57.01 Describe the security features a server operating system.		
	57.02 Use security templates to secure computers.		
	57.03 Test computer security policy.		
	57.04 Configure auditing.		
	57.05 Manage security logs.		
58.0	Administer servers remotely. – The student will be able to:		
	58.01 Explain the tasks, tools, and rights that are required to administer a server.		
	58.02 Configure remote access for administration and client preferences.		
	58.03 Manage remote desktop connections.		
59.0	Monitor server performance by using performance tools, configure and manage performance logs, configure and manage alerts, and manage system monitor views. – The student will be able to:		
	59.01 Establish a performance baseline.	LAFS.910.SL.2.5, LAFS.1112.SL.2.6 LAFS.910.W.2.6, LAFS.1112.W.2.6	
	59.02 Perform real-time and logged monitoring.		
	59.03 Configure and manage counter logs.		
	59.04 Configure alerts.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
60.0	Collect performance data by monitoring primary server subsystems and identify system bottlenecks by using the performance monitoring software. – The student will be able to:		
60.01	Explain how the four primary server subsystems affect server performance.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
60.02	Monitor server memory.		
60.03	Monitor processor usage.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
60.04	Monitor disks.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
60.05	Monitor network usage.		
60.06	Identify the guidelines for using counters and thresholds.		
60.07	Describe the best practices for monitoring server performance.		
61.0	Maintain device drivers. – The student will be able to:		
61.01	Configure device driver signing.		
61.02	Restore the previous version of a device driver.		
62.0	Use software tools to manage and set up disks. – The student will be able to:		
62.01	Initialize and partition a disk.		
62.02	View and update disk properties.		
62.03	Manage mounted drives.		
62.04	Create volumes on a disk.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
62.05	Convert a disk from basic to dynamic and from dynamic to basic.		
62.06	Import disks.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
63.0	Use file encryption for security of data. – The student will be able to:		
63.01	Manage disk based file compression.		
63.02	Configure file encryption.		
63.03	Implement disk quotas.		
64.0	Plan for a computer disaster and use the features of a server operating system to prevent a disaster or recover when one occurs. – The student will be able to:		
64.01	Prepare for disaster recovery.		
64.02	Back up data.		
64.03	Schedule backup jobs.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
64.04	Restore data.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
64.05	Configure a shadow copy.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
64.06	Recover from server failure.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
64.07	Select a disaster recovery method.		
65.0	Manage and distribute critical software updates that resolve known security vulnerabilities and other stability issues. – The student will be able to:		
65.01	Install and configure client computers to use receive software updates.		
65.02	Install and configure servers to use perform software updates.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
65.03	Manage the Software Update Services infrastructure.	MAFS.912.N-Q-1.1	
66.0	Construct and assign IP addresses and isolate addressing issues associated with the IP routing process. – The student will be able to:		
66.01	Convert IP Addresses from decimal to binary.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	66.02 Calculate a subnet mask.		
	66.03 Create subnets using VLSM and CIDR.		
	66.04 Isolate addressing issues associated with the IP routing process.		
67.0	Configure an internet protocol (IP) address for client computers. – The student will be able to:		
	67.01 Configure a client to use a static IP address.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	67.02 Configure a client to obtain an IP address automatically by using DHCP.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	67.03 Configure a client to obtain an IP address automatically by using Alternate Configuration.		
68.0	Configure name resolution mechanisms for clients on a network and describe the name resolution process. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	68.01 Use ARP to identify client media access control (MAC) addresses.		
	68.02 Describe the function of Network Basic Input/Output System (NetBIOS).		
	68.03 Configure a client to use a static IP address.		SC.912.N.1.6-10
	68.04 Configure a client to use name resolution servers.		
69.0	Isolate common connectivity issues and describe how to use utilities and tools as part of this process. – The student will be able to:		
	69.01 Isolate common connectivity issues.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	69.02 Use a flow chart to isolate a problem.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	69.03 Use utilities and tools to isolate a problem.		
70.0	Configure a routing solution for a network environment. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	70.01 Describe the role of routing in the network infrastructure.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	70.02 Enable and configure the Routing and Remote Access service.		
	70.03 Configure packet filters.		
71.0	Allocate IP addressing in a network environment. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	71.01 Describe the role of DHCP in the network infrastructure.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	71.02 Add and authorize a DHCP Server service.		
	71.03 Configure a DHCP scope.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	71.04 Configure DHCP options.		
	71.05 Configure a DHCP reservation.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	SC.912.N.1.1.6
	71.06 Configure a DHCP relay agent.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	SC.912.N.1.1.6
72.0	Manage the DHCP service to reflect changing client IP addressing needs and monitor DHCP server performance. – The student will be able to:		
	72.01 Manage a DHCP database.		
	72.02 Monitor DHCP.		
	72.03 Apply security guidelines for DHCP.		
73.0	Assign computer names to the IP addresses of the source and destination hosts, and then use the computer name to contact the hosts. – The student will be able to:		
	73.01 Describe the name resolution process.		
	73.02 View names on a client.		
	73.03 Configure host name resolution.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
74.0	Resolve host names by using domain name system. – The student will be able to:		
	74.01 Describe the role of DNS in the network infrastructure.		
	74.02 Install the DNS Server service.	LAFS.910.SL.2.5, LAFS.1112.SL.2.5 LAFS.910.W.2.6, LAFS.1112.W.2.6	
	74.03 Configure the properties for the DNS Server service.		
	74.04 Configure the DNS zones.		
	74.05 Configure DNS zone transfers.		
	74.06 Configure dynamic updates.		
	74.07 Configure a DNS client.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	74.08 Delegate authority for zones.		
75.0	Manage and monitor DNS servers to ensure that they are functioning properly and to optimize network performance. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	75.01 Configure the Time-to-Live (TTL) value.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	75.02 Configure aging and scavenging.		
	75.03 Integrate DNS with WINS.		
	75.04 Test the DNS server configuration.		
	75.05 Monitor DNS server performance.		
76.0	Configure a server with the routing and remote access service, create appropriate remote access connections on a network access server, and configure users' access rights. – The student will be able to:		
	76.01 Describe a network access infrastructure.		
	76.02 Configure a virtual private network (VPN) connection.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	76.03 Configure a dial-up connection.		
	76.04 Configure a wireless connection.		
	76.05 Control remote user access to a network.		
	76.06 Centralize authentication and policy management for network access by using Internet Authentication Service (IAS).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
77.0	Manage and monitor network access and the network access services. – The student will be able to:		
	77.01 Configure logging on the network access server.		
	77.02 Collect and monitor network access data.		
78.0	Perform installation of a network client operating system. – The student will be able to:		
	78.01 Plan a client operating system installation.		
	78.02 Install a client operating system.		
	78.03 Upgrade a client operating system from an earlier version.		
	78.04 Automate the installation process for a client operating system.		
79.0	Install and configure hardware devices. – The student will be able to:		
	79.01 Configure hardware devices and drivers on a computer running a client OS.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	79.02 Add and remove devices by using built in utilities and wizards.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	79.03 Restore device drivers.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
80.0	Configure and manage file systems. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	80.01 Work with file systems.		
	80.02 Manage data compression.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
80.03 Secure data by using EFS.		
80.04 Configure disk compression.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
80.05 Secure files by using EFS.	MAFS.912.N-Q-1.1	
81.0 Troubleshoot the boot process and other system issues. – The student will be able to:		
81.01 Examine the boot process.		
81.02 Control system settings during the boot process.		
81.03 Change startup behavior.		
81.04 Use advanced boot options to troubleshoot startup problems.		
81.05 Restore a computer to a previous state.		
81.06 Troubleshoot the boot process and other system issues.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
82.0 Configure the desktop. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
82.01 Configure user desktop settings.		
82.02 Customize the desktop environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
82.03 Configure system settings.		
82.04 Describe how user profiles and group policy affect desktop customization.		
83.0 Configure IP addresses and name resolution. – The student will be able to:		SC.912.N.1.6-10
83.01 Configure IP addresses.		
83.02 Troubleshoot IP addresses.		
83.03 Determine TCP/IP name resolution methods.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
83.04 Configure a DNS and WINS client.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
83.05 Connect to a remote host.		
83.06 Configure IP addresses.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
83.07 Configure the DNS client.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
84.0 Configure the client to work in a network environment. – The student will be able to:		
84.01 Examine workgroups and user accounts.		
84.02 Create and authenticate local user accounts.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
84.03 Configure local security.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
84.04 Configure logon options.		
84.05 Configure networking.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
84.06 Join a domain.		
84.07 Operate in a domain.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	SC.912.N.1.1.6
85.0 Support remote users. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	SC.912.N.1.1.6
85.01 Establish remote access connections.		
85.02 Connect to Virtual Private Networks.		
85.03 Configure inbound connections.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	85.04 Configure authentication protocols and encryption.		
	85.05 Using remote desktop.		
	85.06 Store user names and passwords to facilitate remote connections.		
	85.07 Configure a VPN connection.		
	85.08 Configure and using remote desktop.		
	85.09 Store user names and passwords.		
86.0	Configure a client OS for mobile computing. – The student will be able to:		
	86.01 Configure hardware for mobile computing.	LAFS.910.SL.2.5, LAFS.1112.SL.2.6 LAFS.910.W.2.6, LAFS.1112.W.2.6	
	86.02 Configure power management options for mobile computing.		
	86.03 Make files, folders, and web pages available for offline use.		
87.0	Monitor resources and performance. – The student will be able to:		
	87.01 Determine system information.		
	87.02 Use task manager to monitor system performance.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	87.03 Use performance and maintenance tools to improve performance.		
	87.04 Monitor event logs.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	87.05 Configure program compatibility.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
88.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
	88.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	88.02 Explain emergency procedures to follow in response to workplace accidents.		
	88.03 Create a disaster and/or emergency response plan.		
89.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
	89.01 Employ leadership skills to accomplish organizational goals and objectives.		
	89.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
	89.03 Conduct and participate in meetings to accomplish work tasks.		
	89.04 Employ mentoring skills to inspire and teach others.		
90.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
	90.01 Identify and demonstrate positive work behaviors needed to be employable.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	90.02 Develop personal career plan that includes goals, objectives, and strategies.		
	90.03 Examine licensing, certification, and industry credentialing requirements.		
	90.04 Maintain a career portfolio to document knowledge, skills, and experience.		
	90.05 Evaluate and compare employment opportunities that match career goals.		
	90.06 Identify and exhibit traits for retaining employment.		
	90.07 Identify opportunities and research requirements for career advancement.		
	90.08 Research the benefits of ongoing professional development.		
	90.09 Examine and describe entrepreneurship opportunities as a career planning option.		
	90.10 Research, compare and contrast investment opportunities.		

Florida Department of Education
Student Performance Standards

Course Title: **Networking 4, Administration**
Course Number: **8207443**
Course Credit: **1**

Course Description:

This course continues the study of network support services. The content includes the planning, implementation, and management of server and client operating systems in a networking environment.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
91.0	Apply communication skills (reading, writing, speaking, listening, viewing) in a courteous, concise, and correct manner on personal and professional levels. – The student will be able to:		
91.01	Communicate technical information in a concise, understandable manner to a non-technical audience both verbally and in writing.		
92.0	Participate in work-based learning experiences. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
92.01	Participate in work-based learning experiences in a network support services environment.		
92.02	Discuss the use of technology in a network support services environment.		
92.03	Compare and contrast the software applications used in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
93.0	Plan a network infrastructure. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
93.01	Explain how to plan a network.		
93.02	Explain how to prepare development and test environments.		
93.03	Explain the concepts of managing and maintaining a network environment by using specific tools.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112,W.1.2 MAFS.912.N-Q-1.1	
93.04 Explain the technologies and services implemented in a network.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 MAFS.912.N-Q-1.1	
94.0 Plan and optimize a TCP/IP physical and logical network. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 MAFS.912.N-Q-1.1	
94.01 Discuss TCP/IP.	MAFS.912.N-Q-1.1	
94.02 Plan a TCP/IP addressing scheme.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
94.03 Optimize network performance.		
95.0 Plan and troubleshoot routing. – The student will be able to:		
95.01 Describe how routing works.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
95.02 Create a secure routing plan.		
95.03 Identify TCP/IP routing trouble shooting tools.		
95.04 Troubleshoot TCP/IP routing.		
96.0 Plan a DHCP strategy. – The student will be able to:		
96.01 Demonstrate how DHCP operates in an enterprise environment.		
96.02 Plan a DHCP strategy.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
96.03 Secure a DHCP strategy.		
97.0 Plan a DNS strategy. – The student will be able to:		
97.01 Plan a namespace strategy.		
97.02 Plan zones.		
97.03 Plan zone replication.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
97.04 Plan a DNS server implementation.		
98.0 Optimize and troubleshoot DNS. – The student will be able to:		
98.01 Optimize a DNS server.		
98.02 Optimize the DNS server-to-server communications.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
98.03 Optimize DNS client support traffic.		
98.04 Troubleshoot host name resolution.		
99.0 Plan and troubleshoot IPSEC. – The student will be able to:		
99.01 Discuss IPSec.		
99.02 Understand IPSec default policies, rules, and settings.		
99.03 Plan IPSec deployment.		
99.04 Troubleshoot IPSec.		
100.0 Plan a network access. – The student will be able to:		
100.01 Select appropriate connection methods for a network access strategy.		
100.02 Select a remote access policy strategy.		
100.03 Select a network access authentication method.		
100.04 Plan a network access strategy.		
101.0 Troubleshoot network access. – The student will be able to:		
101.01 Identify network access troubleshooting resources.		
101.02 Troubleshoot network authentication.		
101.03 Troubleshoot LAN authentication.		
101.04 Troubleshoot remote access.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
102.0 Analyze global director infrastructure. – The student will be able to:		
102.01 Describe the architecture of global directory.		
102.02 Describe the working of global directory.		
102.03 Use administrative tools to examine the components of global directory.		
102.04 Describe the global directory design, planning, and implementation processes.		
103.0 Implement a global directory structure and domain structure. – The student will be able to:		
103.01 Create a forest and domain structure.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
103.02 Configure DNS in a global directory environment.		
103.03 Raise the functional level of a forest and a domain.		
103.04 Create trust relationships between domains.		
103.05 Secure trusts by using SID filtering.		
104.0 Implement an organizational unit structure. – The student will be able to:		
104.01 Create an organizational unit.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
104.02 Delegate control for an organizational unit.		
104.03 Plan an organization unit strategy.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
105.0 Implement user, group, and computer accounts. – The student will be able to:		
105.01 Describe the types of global directory accounts and groups.		
105.02 Create multiple user and computer accounts.		
105.03 Implement UPN suffixes.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
105.04 Move objects within a domain and across domains in a global structure.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
105.05 Plan a strategy for user computer and group accounts.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
105.06 Plan a global directory audit strategy.		
106.0 Implement group policy. – The student will be able to:		
106.01 Create and configure group policy objects.		
106.02 Manage group policy objects.		
106.03 Verify and troubleshoot group policies.		
106.04 Delegate administrative control of group policies.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
106.05 Plan a group policies strategy for the enterprise.		
107.0 Deploy and manage software by using group policies. – The student will be able to:		
107.01 Explain the basic concepts of software deployment by using group policies.		
107.02 Deploy software by using group policies.		
107.03 Configure software deployment by using group policies.		
107.04 Maintain deployed software by using group policies.		
107.05 Troubleshoot some common problems with software deployment.		
107.06 Plan a software deployment strategy.		
108.0 Implement sites to manage global directory replication. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
108.01 Explain the components and the process of replication.		
108.02 Create and configure sites.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
108.03 Manage a global directory site topology.		
108.04 Monitor and troubleshoot global directory replication failures.		
108.05 Plan a site strategy.		
109.0 Implement placement of domain controllers. – The student will be able to:		
109.01 Implement a global catalog in a global directory.		
109.02 Determine the placement of domain controllers in a global directory.		
109.03 Create a plan for placing domain controllers in a global directory.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
110.0 Use a framework for designing security and create a security design team. – The student will be able to:		
110.01 Describe common elements of security policies and procedures.		
110.02 Create a security design framework.		
110.03 Create a security design team.		
111.0 Recognize and predict common threats by using a threat model. – The student will be able to:		
111.01 Explain common network vulnerabilities and how attackers can exploit them.		
111.02 Predict threats to security by using the STRIDE (Spoofing, Tampering, Repudiation, Information disclosure, Denial of service, Elevation of privilege) threat model.		
112.0 Apply a framework for planning risk management. – The student will be able to:		
112.01 Explain the purpose and operation of risk management.		
112.02 Draft the elements of a risk management plan.		
113.0 Design security for physical resources. – The student will be able to:		
113.01 Determine threats and analyze risks to physical resources.		
113.02 Design security for physical resources.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
114.0 Design security for computers. – The student will be able to:		
114.01 Determine threats and analyze risks to computers.		
114.02 Design security for computers.		
115.0 Design security for accounts. – The student will be able to:		
115.01 Determine threats and analyze risks to accounts.		
115.02 Design security for accounts.		
116.0 Design security for authentication. – The student will be able to:		
116.01 Determine threats and analyze risks to authentication.		
116.02 Design security for authentication.		
117.0 Design security for data. – The student will be able to:		
117.01 Determine threats and analyze risks to data.		
117.02 Design security for data.		
118.0 Design security for data transmission. – The student will be able to:		
118.01 Determine threats and analyze risks to data transmission.		
118.02 Design security for data transmission.		
119.0 Design security for network perimeters. – The student will be able to:		
119.01 Determine threats and analyze risks to network perimeters.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
119.02 Design security for network perimeters.		
120.0 Design an audit policy and an incident response procedure. – The student will be able to:		
120.01 Explain the importance of auditing and incident response.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
120.02 Design an auditing policy.		
120.03 Design an incident response procedure.		

Florida Department of Education
Student Performance Standards

Course Title: **Networking 5**
Course Number: **8207060**
Course Credit: **1**

Course Description:

This course continues the study of network support services. The content includes wireless networking technologies, implementation, management and security.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
121.0 Participate in work-based learning experiences. – The student will be able to:		
121.01 Participate in work-based learning experiences in a network support services environment.		
121.02 Discuss the use of technology in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
121.03 Discuss the management/supervisory skills needed in a network support service environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
122.0 Demonstrate proficiency in applying radio frequency (RF) technologies. – The student will be able to:		
122.01 Define and apply the basic concepts of RF behavior.	LAFS.910.L.3.6, LAFS.1112.L.3.6	SC.912.P.10.17, SC.912.P.10.18, SC.912.E.5.8
122.02 Understand the applications of basic RF antenna concepts.		
122.03 Understand and apply the basic components of RF.		SC.912.P.10.17, SC.912.P.10.18, SC.912.E.5.8
122.04 Identify some of the different uses for spread spectrum technologies.		SC.912.P.10.18, SC.912.E.5.8
122.05 Comprehend the differences between, and apply the different types of spread spectrum technologies.		SC.912.P.10.18

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
122.06	Identify and apply the concepts which make up the functionality of spread spectrum technology.		SC.912.P.10.18
122.07	Identify the laws set forth by the FCC that govern spread spectrum technology, including power outputs, frequencies, bandwidths, hop times, and dwell times.		
123.0	Develop an awareness of wireless LAN technologies. – The student will be able to:		
123.01	Identify and apply the processes involved in authentication and association.		SC.912.P.10.18
123.02	Recognize the concepts associated with wireless LAN service sets.		
123.03	Understand the implications of the following power management features of wireless LANs.		
123.04	Specify the modes of operation involved in the movement of data traffic across wireless LANs.		SC.912.P.10.18
124.0	Perform implementation and management activities. – The student will be able to:		
124.01	Identify the technology roles for which wireless LAN technology is an appropriate technology application.		
124.02	Identify the purpose of infrastructure devices and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
124.03	Identify the purpose of wireless LAN client devices and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
124.04	Identify the purpose of wireless LAN gateway devices and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
124.05	Identify the basic attributes, purpose, and function of types of antennas.		
124.06	Describe the proper locations and methods for installing antennas.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
124.07	Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antennas.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
124.08	Identify the use of wireless LAN accessories and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
124.09	Identify, understand, correct or compensate for wireless LAN implementation challenges.		
124.10	Explain how antenna diversity compensates for multipath.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
124.11	Identify and understand the importance and process of conducting a thorough site survey.		
124.12	Identify and understand the importance of the necessary tasks involved in preparing to do an RF site survey.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
124.13 Identify the necessary equipment involved in performing a site survey.		
124.14 Understand the necessary procedures involved in performing a site survey.		
124.15 Identify and understand site survey reporting procedures.		
125.0 Develop an awareness of wireless security systems. – The student will be able to:		
125.01 Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques.		
125.02 Describe types of wireless LAN security attacks, and explain how to identify and prevent them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
125.03 Given a wireless LAN scenario, identify the appropriate security solution from the following available wireless LAN security solutions.		
125.04 Explain the uses of corporate security policies and how they are used to secure a wireless LAN.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
125.05 Identify how and security precautions are used to secure a wireless LAN.		
126.0 Demonstrate knowledge of wireless industry standards. – The student will be able to:		
126.01 Identify, apply and comprehend the differences between wireless LAN standards.		SC.912.P.10.18
126.02 Understand the roles of organizations in providing direction and accountability within the wireless LAN industry.		
126.03 Identify the differences between the ISM and UNII bands.		
126.04 Identify and understand the differences between the power output rules for point-to-point and point-to-multipoint links.		
126.05 Identify the basic characteristics of infrared wireless LANs.		SC.912.P.10.18

Florida Department of Education
Student Performance Standards

Course Title: **Networking 6**
Course Number: **8207070**
Course Credit: **1**

Course Description:

This course continues the study of network support services. The content includes network security.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
127.0 Participate in work-based learning experiences. – The student will be able to:		
127.01 Participate in work-based learning experiences in a network support services environment.		
127.02 Discuss the use of technology in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
127.03 Discuss the management/supervisors skills needed in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
128.0 Demonstrate a knowledge of general security concepts. – The student will be able to:		
128.01 Describe access control.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
128.02 Describe network authentication.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
128.03 Understand the various types of network attacks (backdoors, DOS, spoofing)		
128.04 Identify and modify non-essential services and protocols.		
128.05 Identify malicious code (virus, worm, Trojan).		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
128.06 Configure system auditing, logging, and scanning as it relates to security procedures.		
129.0 Develop an awareness of communication security concepts. – The student will be able to:		
129.01 Describe remote access protocols (VPN, RADIUS, L2TP).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
129.02 Identify Email security concerns (hoaxes, spam).		
129.03 Identify web (HTML) security concepts and designs (HTTP/S, IM).		
129.04 Demonstrate an awareness of file transfer security concerns.		
129.05 Describe and identify wireless networking security concerns and vulnerabilities.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
130.0 Develop an awareness of network infrastructure security. – The student will be able to:		
130.01 Install and configure network firewalls.		
130.02 Identify security concerns with various wiring media (copper, fiber).		
130.03 Identify security concerns associated with removable media and storage devices.		
130.04 Demonstrate an awareness of security topologies (security zones, Intranets, NAT).		
130.05 Configure and use intrusion detection software.		
130.06 Establish security baselines (updates, patches, hot fixes, Access Control lists).		
130.07 Demonstrate the ability to configure a Virtual Private Network (VPN).		
130.08 Describe the function of Network Address Translation (NAT).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
131.0 Develop an awareness of cryptography and its relation to security. – The student will be able to:		
131.01 Demonstrate an understanding of security algorithms and encryption.	MAFS.912.A-REI.2.3	
131.02 Use and apply Public Key Certificates.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
131.03	Demonstrate an understanding of standards and protocols in commerce.		
132.0	Incorporate organizational and operational security in an appropriate and effective manner. – The student will be able to:		
132.01	Describe how to establish a network security policy.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
132.02	Explain the importance of physical security to protect network resources.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
132.03	Identify and use disaster recovery procedures.		
132.04	Describe the importance of business continuity and its relationship to network and corporate security.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
132.05	Describe security policies and procedures that would be used in a business environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
132.06	Explain the importance of privilege management (access, password management, sign-on).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
132.07	Describe the concept of forensics as it applies to network security (obtaining evidence of security breaches).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
132.08	Explain the importance of educating users and supervisors in regard to network security.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
132.09	Create documentation that describes standards and guidelines for a network security system.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Support Services**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8208000
CIP Number	0511090102
Grade Level	9-12, 30, 31
Standard Length	7 credits
Teacher Certification	BUS ED 1 @2 VOE @7 TC COOP ED @7 BUS DP @7 %G ELECT DP @7 %G BOOKKEEPIN @4 7 G CLERICAL @7 G SECRETAR 7G TEC ELEC $7 G COMPU SCI 6 COMP SVC 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1142 – Network and Computer Systems Administrators 15-1143 – Computer Network Architects
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in network support services positions in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific

skills, and knowledge of all aspects of the Information Technology career cluster. This program offers a broad foundation of knowledge and skills to prepare students for employment.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of Digital Information Technology and six additional occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	8207020	Networking 1	1 credit	15-1151	2	VO
C	8207030	Networking 2, Infrastructure	1 credit	15-1142	3	VO
D	8207040	Networking 3, Infrastructure	1 credit	15-1142	3	VO
E	8207050	Networking 4, Infrastructure	1 credit	15-1143	3	VO
F	8207060	Networking 5	1 credit	15-1143	3	VO
G	8207070	Networking 6	1 credit	15-1143	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1	Environmental Science
8207310	15/87 17%	22/80 28%	14/83 17%	20/69 29%	12/67 18%	15/69 22%	12/82 15%	23/66 35%	16/74 22%	18/72 25%	23/70 33%
8207020	3/87 3%	3/80 4%	2/83 2%	3/69 4%	2/67 3%	3/69 4%	2/82 2%	3/66 5%	2/74 3%	3/72 4%	2/70 3%
8207230	22/87 25%	22/80 28%	3/83 4%	22/69 32%	3/67 4%	22/69 32%	3/82 4%	17/66 26%	3/74 4%	22/72 31%	21/70 30%
8207040	23/87 26%	24/80 30%	5/83 6%	24/69 35%	5/67 7%	23/69 33%	5/82 6%	19/66 29%	5/74 7%	24/72 33%	22/70 31%
8207050	1/87 1%	1/80 1%	2/83 2%	1/69 1%	2/67 3%	1/69 1%	2/82 2%	1/66 2%	2/74 3%	1/72 1%	#
8207060	#	2/80 3%	1/83 1%	1/69 1%	2/67 3%	#	2/82 2%	#	2/74 3%	1/72 1%	#
8207070	1/87 1%	1/80 1%	1/83 1%	1/69 1%	1/67 1%	1/69 1%	1/82 1%	1/66 2%	1/74 1%	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	#
8207020	22/67 33%	25/75 33%	18/54 33%	11/46 24%	11/45 24%	12/45 27%	12/45 12%
8207230	10/67 15%	14/75 19%	8/54 15%	3/46 7%	3/45 7%	3/45 7%	3/45 7%
8207040	9/67 13%	14/75 19%	8/54 15%	4/46 9%	4/45 9%	4/45 9%	4/45 9%
8207050	2/67 3%	1/75 1%	1/54 2%	#	#	#	#
8207060	1/67 1%	1/75 1%	1/54 2%	#	#	#	#
8207070	2/67 3%	1/75 1%	1/54 2%	2/46 4%	2/45 4%	2/45 4%	2/45 4%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Network Support Services.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Network Support Services.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Network Support Services.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
19.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules.
20.0 Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment.
21.0 Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
22.0 Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems.
23.0 Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems.

24.0 Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked.
25.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
26.0 Demonstrate proficiency using graphical user interface (GUI) operating systems.
27.0 Demonstrate language arts knowledge and skills.
28.0 Demonstrate mathematics knowledge and skills.
29.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Network Support Services.
30.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Network Support Services.
31.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Network Support Services.
32.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
33.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
34.0 Understand, describe, and explain internet connections.
35.0 Define networking terminology.
36.0 Explain how to connect copper media, optical media, and wireless media.
37.0 Perform tasks related to the network cable testing and cable making.
38.0 Define network topologies, devices and connections.
39.0 Define Ethernet fundamentals and operations.
40.0 Define and explain the functions of bridges and switches.
41.0 Explain the mathematical concepts and protocols behind the internet.
42.0 Define and explain the difference between routed and routing protocols.
43.0 Recognize, define, and explain functions of the transport layer.
44.0 Explain, define, and identify the components of a WAN and router.
45.0 Describe and identify an operating system for a router.
46.0 Explain how to establish connections between neighboring routers.
47.0 Identify and explain the router boot sequence and file system.
48.0 Identify and explain static and dynamic routing protocols.
49.0 Describe and configure distance vector protocols.
50.0 Perform tasks related to protocol troubleshooting.
51.0 Examine and test networks.
52.0 Define, explain and describe access lists.
53.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
54.0 Solve problems using critical thinking skills, creativity and innovation.
55.0 Use information technology tools.
56.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
57.0 Describe the importance of professional ethics and legal responsibilities
58.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. Participate in work-based learning experiences.

59.0 Participate in work-based learning experiences.
60.0 Provide network support and assistance by troubleshooting and diagnosing through direct contact remote access.
61.0 Develop electronic communications skills.
62.0 Perform logical and physical network design activities.
63.0 Demonstrate proficiency in selecting appropriate various routing protocols and IP routing configuration for various network designs.
64.0 Demonstrate proficiency in using network traffic filtering to improve network performance and provide basic levels of security.
65.0 Perform network management activities related to documentation, security, performance, administration, troubleshooting and coping with environmental factors.
66.0 Identify and describe various van functions, devices, and demonstrate understanding of the wan design process.
67.0 Describe the operation and implementation of virtual private networks.
68.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
69.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
70.0 Explain the importance of employability skill and entrepreneurship skills.
71.0 Demonstrate personal money-management concepts, procedures, and strategies.
72.0 Participate in work-based learning experiences.
73.0 Compare and contrast hierarchical network design models and scalable internetworks.
74.0 Discuss advanced IP addressing management.
75.0 Demonstrate proficiency in basic router configuration.
76.0 Demonstrate proficiency in the use of OSPF.
77.0 Understand and discuss multi-area OSPF operation and configuration.
78.0 Demonstrate the use of stub and totally stubby areas.
79.0 Configure and define virtual links.
80.0 Demonstrate proficiency in the use of EIGRP.
81.0 Demonstrate proficiency in route optimization.
82.0 Demonstrate proficiency in the use of BGP.
83.0 Define and show proficiency in security.
84.0 Use lab equipment, demonstrate the setup, configuration, connectivity of routers to create a small WAN.
85.0 Show the process of using modems and asynchronous dialup connections.
86.0 Configure and verify PPP configurations.
87.0 Configure and monitor ISDN and DDR.
88.0 Configure dialer profiles.
89.0 Create and troubleshoot X.25 configurations.
90.0 Configure and troubleshoot frame relay.
91.0 Demonstrate the use of WAN backup and dial backup.
92.0 Demonstrate the use of queuing and compression techniques.
93.0 Demonstrate the use of scaling IP addresses with NAT.
94.0 Demonstrate proficiency using AAA to scale access control.
95.0 Discuss and explain emerging remote-access technologies.
96.0 Understand and describe key characteristics of various switching technologies, LAN switching and the hierarchical model of network design, and the building-block approach.
97.0 Understand and describe campus networks, design models, and switching technologies.

98.0 List and describe various types of LAN media.
99.0 Show proficiency configuring a switch.
100.0 Demonstrate proficiency configuring VLANS.
101.0 Understand and explain spanning tree protocol (STP) AND redundant links.
102.0 Demonstrate proficiency routing between VLANS.
103.0 Demonstrate proficiency with multilayer switching.
104.0 Demonstrate the use of hot standby routing protocol (HSRP).
105.0 Understand and use IGMP and multicasting.
106.0 Demonstrate proficiency restricting network access.
107.0 Demonstrate proficiency using network troubleshooting tools and basic network management diagnostic tools.
108.0 List and define the commonly used protocols, routing techniques, and switching processes
109.0 Demonstrate proficiency troubleshooting TCP/IP, LAN switch environment, VLANS, frame relay, and ISDN.
110.0 Demonstrate proficiency troubleshooting EIGRP, OSPF, and BGP.
111.0 Participate in work-based learning experiences.
112.0 Demonstrate proficiency in applying radio frequency (RF) technologies.
113.0 Develop an awareness of wireless LAN technologies.
114.0 Perform implementation and management activities.
115.0 Develop an awareness of wireless security systems.
116.0 Demonstrate knowledge of wireless industry standards.
117.0 Participate in work-based learning experiences.
118.0 Demonstrate knowledge of general security concepts.
119.0 Develop an awareness of communication security concepts.
120.0 Develop an awareness of network infrastructure security.
121.0 Develop an awareness of cryptography and its relation to security.
122.0 Incorporate organizational and operational security in an appropriate and effective manner.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Networking 1**
Course Number: **8207020**
Course Credit: **1**

Course Description:

This course is designed to develop competencies needed for employment in network support positions. The content includes instruction in basic hardware configuration, hardware and software troubleshooting, operating systems, and computer networking.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Network Support Services.		
01.01	Key Ideas and Details		
01.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
01.02.1		Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2		Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3		Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Network Support Services.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly	

Florida Standards			Correlation to CTE Program Standard #
		and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Network Support Services.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	
	03.08	Look for and express regularity in repeated reasoning.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:	LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112, SL.1.3	
18.01 Develop strategies for resolving customer conflicts.		
19.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
19.01 Identify and describe the functions of main processing boards (e.g., CPUs, RAM, ROM, bus architecture).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
19.02 Identify and describe the functions of communication ports (e.g., serial and parallel ports).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
19.03 Identify and describe the functions of peripheral devices (e.g., scanners, modems, hard drives, printers).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
19.04 Identify and describe the components of portable systems (e.g., battery, LCD, AC adapter, PDAs).		
19.05 Troubleshoot, install and upgrade computers and peripherals.		
19.06 Perform system hardware setup. Demonstrate an understanding of input/output devices.		
19.07 Installation and configuration of applications software, hardware, and device drivers.		
19.08 Demonstrate an understanding of the operation and purpose of hardware components.		
19.09 Install operating system software.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	19.10 Customize operating systems.		
	19.11 Install application software.		
	19.12 Perform storage formatting and preparation activities.	MAFS.912.N-Q.1.1, MAFS.912.N-Q.1.2	
	19.13 Identify data measurement (e.g., bits, bytes, kilobytes).	MAFS.912.N-Q.1.1, MAFS.912.N-Q.1.2	SC.912.N.1.1.6
	19.14 Install and Configure RAID.		
	19.15 Recognize and report on server room environmental issues (temperature, humidity/ESD/power surges, back-up).		
20.0	Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment. – The student will be able to:		
	20.01 Troubleshoot a personal computer system.		
	20.02 Identify configuration problems.		
	20.03 Identify software problems.		
	20.04 Identify hardware malfunctions.		
	20.05 Identify network malfunctions.		
	20.06 Resolve computer error messages.		
	20.07 Understand and troubleshoot memory and cache systems.		
	20.08 Verify that drives are the appropriate type.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112.2.1.2	
	20.09 Describe knowledge database search procedures used to identify possible solutions when troubleshooting software and hardware problems.		
21.0	Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace. – The student will be able to:		
	21.01 Apply basic rules for hardware safety.		SC912.N.1.1.6
	21.02 Demonstrate proficiency in basic preventative hardware maintenance.		
	21.03 Special disposal procedures that comply with environmental guidelines for batteries, CRTs, toner kits/cartridges, chemical solvents and cans, and MSDS.		
	21.04 Apply ergonomic principles applicable to the configuration of computer workstations.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.W.1.1, LAFS.1112.W.1.1 LAFS.910.W.1.2, LAFS.1112.W.1.2	
	21.05 Describe ethical issues and problems associated with computers and information systems**.**		
22.0	Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems. – The student will be able to:		
	22.01 Identify EDO RAM, DRAM, SRAM, RIMM, VRAM, SDRAM, and WRAM.		
	22.02 Identify memory banks, memory chips (8-bit, 16-bit, and 32-bit), SIMMS (Single In-line Memory Module), DIMMS (Dual In-line Memory Module), parity chips versus non-parity chips.		
	22.03 Identify printer parallel port, COM/serial port, floppy drive, hard drive, Memory, and Boot sequence.		
23.0	Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems. – The student will be able to:		
	23.01 Identify types of printers—Laser, Inkjet, Dot Matrix.		
	23.02 Identify care and service techniques and common problems with primary printer types.		
	23.03 Implement and manage printing on a network.		
24.0	Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked. – The student will be able to:	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	24.01 Define networking and describe the purpose of a network.		
	24.02 Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112.W.1.2	
	24.03 Describe the various types of network topologies.		
	24.04 Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.		
	24.05 Configure network and verify network connectivity.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
24.06	Discuss the responsibilities of the network administrator (e.g., rights and responsibilities).		
24.07	Develop user logon procedures.		
24.08	Utilize network management infrastructures (e.g., network monitoring, alerting, security) to perform administrative tasks.		
24.09	Identify common backup strategies and procedures.		
24.10	Select and use appropriate electronic communications software and hardware for specific tasks.		
24.11	Compare and contrast Internet software and protocols.		
24.12	Diagnose and resolve electronic communications operational problems.		
24.13	Design and implement directory tree structures.		
24.14	Install services tools (SNMP, backup software).		
24.15	Perform full backup and verify backup.		
24.16	Identify bottlenecks (e.g., processor, bus transfer, I/O, disk I/O, network I/O, memory).		
24.17	Use the concepts of fault tolerance/fault recovery to create a disaster recovery plan.	LAFS. 910.W.1.2, LAFS.1112.W.1.2	
24.18	Document and test disaster recovery plan regularly, and update as needed.		
25.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, email, internet, remote access, or direct contact. – The student will be able to:	LAFS.910.SL.2.4, LAFS.1112.SL.2.4 LAFS.910.SL.2.6, LAFS.1112.SL.2.6	
25.01	Apply call center vocabulary.		
25.02	Listen and input information simultaneously.		
25.03	Apply first response assistance for minor repair work.		
26.0	Demonstrate proficiency using graphical user interface (GUI) operating systems. – The student will be able to:		
26.01	Identify parts of GUI windows.		
26.02	Create and use icons.		
26.03	Demonstrate proficiency in using menu systems.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
26.04 Demonstrate proficiency in using pointing and selection devices.		
26.05 Identify keyboard shortcuts and special function keys.		
26.06 Demonstrate proficiency in manipulating windows.		
26.07 Utilize help systems and hypertext links.		
26.08 Create, organize, and maintain file system directories.		
26.09 Organize desktop objects.		
26.10 Run multiple applications.		
27.0 Demonstrate language arts knowledge and skills. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.SL.1.3, LAFS.1112.SL.1.3 LAFS.910.RI.3.7, LAFS.1112.RI.3.7 LAFS.910.RI.3.8, LAFS.1112.RI.3.8	
27.01 Locate, comprehend and evaluate key elements of oral and written information.	LAFS.910.W.2.5, LAFS.1112.W.2.5	
27.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.	LAFS.910.SL.2.4, LAFS.1112.SL.2.4 LAFS.910.SL.2.5, LAFS.1112.SL.2.5 LAFS.910.SL.2.6, LAFS.1112.SL.2.6	
27.03 Present information formally and informally for specific purposes and audiences.		
28.0 Demonstrate mathematics knowledge and skills. – The student will be able to:		
28.01 Demonstrate knowledge of arithmetic operations.	MAFS.912.N-Q.1.1, MAFS.912.N-Q.1.2	SC912.N.1.1.6
28.02 Analyze and apply data and measurements to solve problems and interpret documents.	MAFS.912.F-IF.2.4	SC912.N.1.1.6
28.03 Construct charts/tables/graphs using functions and data.	MAFS.912.F-IF.3.9	SC912.N.1.1.6

Florida Department of Education
Student Performance Standards

Course Title: **Networking 2, Infrastructure**
Course Number: **8207030**
Course Credit: **1**

Course Description:

This course focuses on understanding network terminology and protocols, local-area networks, wide-area networks, OSI models, cabling, cabling tools, routers, router programming, Ethernet, IP addressing and network standards.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Network Support Services.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		

Florida Standards			Correlation to CTE Program Standard #
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Network Support Services.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.WHST.2.6	
	30.03 Research to Build and Present Knowledge		
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04 Range of Writing		
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Network Support Services.		
	31.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
	31.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
	31.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
	31.04 Model with mathematics. MAFS.K12.MP.4.1		
	31.05 Use appropriate tools strategically. MAFS.K12.MP.5.1		
	31.06 Attend to precision. MAFS.K12.MP.6.1		
	31.07 Look for and make use of structure. MAFS.K12.MP.7.1		
	31.08 Look for and express regularity in repeated reasoning.		

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:		
32.01 Develop diplomatic methods to communicate with customers.	LAFS.910.SL.1.1, LAFS.910.SL.1.1	
33.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, email, remote access, or direct contact. – The student will be able to:		
33.01 Apply first response assistance for minor repair work.		
34.0 Understand, describe, and explain internet connections. – The student will be able to:		
34.01 Understand the physical connectivity necessary for a computer to connect to the Internet.		
34.02 Recognize the primary components of a computer.		
34.03 Install and troubleshoot network interface cards and/or modems.		
34.04 Use basic testing procedures to test the Internet connection.		
34.05 Demonstrate a basic understanding of the use of Web browsers and plug-ins.		
35.0 Define networking terminology. – The student will be able to:		
35.01 Explain the importance of bandwidth in networking.	LFAS910.SL.1.1, LFAS1112.SL.1.1	
35.02 Identify bps, kbps, Mbps, and Gbps as units of bandwidth.	LFAS910.SL.1.1, LFAS1112.SL.1.1	
35.03 Explain the difference between bandwidth and throughput.	LFAS910.SL.1.1, LFAS1112.SL.1.1 MAFS.912.SSE.1.1	
35.04 Explain the development of the Open System Interconnection model (OSI).	LFAS910.SL.1.1, LFAS1112.SL.1.1, MAFS.912.A-REI.2.3	
35.05 List the advantages of a layered approach.		SC.912.N.1.1.6

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
35.06	Identify each of the seven layers of the OSI model.		
35.07	Identify the four layers of the TCP/IP model.		
35.08	Describe the similarities and differences between the two models.		
35.09	Briefly outline the history of networking.		
35.10	Identify devices used in networking.		
35.11	Understand the role of protocols in networking.		
35.12	Define LAN, WAN, MAN, and SAN.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
35.13	Explain VPNs and their advantages.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
35.14	Describe the differences between intranets and extranets.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112.W.1.2	
36.0	Explain how to connect copper media, optical media, and wireless media. – The student will be able to:		
36.01	Discuss the electrical properties of matter.	LAFS.910.SL.1.1, LAFS.1112.1.1	
36.02	Define voltage, resistance, impedance, current, and circuits.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
36.03	Describe the specifications and performances of different types of cable.	LAFS 910.SL.1.1, LAFS 1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
36.04	Describe coaxial cable and its advantages and disadvantages over other types of cable.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	SC912.N.1.1.6
36.05	Describe shielded twisted-pair (STP) cable and unshielded twisted-pair cable and its uses.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
36.06	Describe (UTP) and their uses.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
36.07	Discuss the characteristics of straight-through, crossover, and rollover cables and where each is used.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	36.08 Explain the basics of fiber-optic cable.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	36.09 Describe how fibers can guide light for long distances.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	36.10 Describe multimode and single-mode fiber.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	36.11 Describe how fiber is installed.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	36.12 Describe the type of connectors and equipment used with fiber-optic cable.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	36.13 Explain how fiber is tested to ensure that it will function properly.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	36.14 Discuss safety issues dealing with fiber-optics.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
37.0	Perform tasks related to the network cable testing and cable making. – The student will be able to:		
	37.01 Differentiate between sine waves and square waves.		
	37.02 Define and calculate exponents and logarithms.	LAFS.910.L.3.6, LAFS.1112.L.3.6 MAFS.912.F-BF.2.5	
	37.03 Define and calculate decibels.	LAFS.910.L.3.6, LAFS.1112.L.3.6 MAFS.912.F-BF.2.5	
	37.04 Define basic terminology related to time, frequency, and noise.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	37.05 Differentiate between digital bandwidth and analog bandwidth.		
	37.06 Compare and contrast noise levels on various types of cabling.		
	37.07 Define and describe the effects of attenuation and impedance mismatch.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
37.08	Define crosstalk, near-end crosstalk, far-end crosstalk, and power sum near-end crosstalk.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
37.09	Describe how crosstalk and twisted pairs help reduce noise.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
37.10	Describe the ten copper cable tests defined in TIA/EIA-568-B.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
37.11	Describe the difference between Category 5 and Category 6 cable.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
38.0	Define network topologies, devices and connections. – The student will be able to perform tasks related to the following:		
38.01	Identify characteristics of Ethernet networks.		
38.02	Identify straight-through, crossover, and rollover cable.		
38.03	Describe the function, advantages, and disadvantages of repeaters, hubs, bridges, switches, and wireless network components.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
38.04	Describe the function of peer-to-peer networks.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
38.05	Describe the function, advantages, and disadvantages of client-server networks.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
38.06	Describe and differentiate between serial, digital subscriber line (DSL), and cable modem WAN connections.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
38.07	Identify router serial ports and their cable and connectors.		
38.08	Identify and describe the placement of equipment used in various WAN configurations.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
39.0	Define Ethernet fundamentals and operations. – The student will be able to:		
39.01	Describe the basics of Ethernet technology.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
39.02	Explain naming rules of Ethernet technology.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
39.03	Define how Ethernet and the OSI model interact.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
39.04	Describe the Ethernet framing process and frame structure.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
39.05	List Ethernet frame field names and purposes.		
39.06	Identify the characteristics of CSMA/CD.		
39.07	Describe the key aspects of Ethernet timing, interframe spacing and backoff time after a collision.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
39.08	Define Ethernet errors and collisions.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
39.09	Explain the concept of auto-negotiation in relation to speed and duplex.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
40.0	Define and explain the functions of bridges and switches. – The student will be able to:		
40.01	Define bridging and switching.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
40.02	Define and describe the content-addressable memory (CAM) table.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
40.03	Define latency.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
40.04	Describe store-and forward and cut-through switching modes.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
40.05	Explain Spanning-Tree Protocol (STP).	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	40.06 Define collisions, broadcasts, collision domains, and broadcast domains.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
	40.07 Identify the Layer 1, 2, and 3 devices used to create collision domains and broadcast domains.		
	40.08 Discuss data flow and problems with broadcasts.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	40.09 Explain network segmentation and list the devices used to create segments.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
41.0	Explain the mathematical concepts and protocols behind the internet. – The student will be able to:		SC912.N.1.1.6
	41.01 Explain why the Internet was developed and how TCP/IP fits the design of the Internet.		SC912.N.1.1.6
	41.02 List the four layers of the TCP/IP model.		SC912.N.1.1.6
	41.03 Describe the functions of each layer of the TCP/IP model.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	41.04 Compare the OSI model and the TCP/IP model.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	41.05 Describe the function and structure of IP addresses.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2 MAFS.912.N-Q.1.1	
	41.06 Understand why subnetting is necessary.		
	41.07 Explain the difference between public and private addressing.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	41.08 Understand the function of reserved IP addresses.		
	41.09 Explain the use of static and dynamic addressing for a device.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	41.10 Use ARP to obtain the MAC address to send a packet to another device.	MAFS.912.N.Q.1.1	
	41.11 Understand the issues related to addressing between networks.		
42.0	Define and explain the difference between routed and routing protocols. – The student will be able to:		
	42.01 Describe routed (routable) protocols.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
42.02	List the steps of data encapsulation in an internetwork as data is routed to one or more Layer 3 devices.		
42.03	Describe connectionless and connection-oriented delivery.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
42.04	Name the IP packet fields.		
42.05	Describe process of routing.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
42.06	Compare and contrast different types of routing protocols.		
42.07	List and describe several metrics used by routing protocols.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
42.08	List several uses for subnetting.		
42.09	Determine the subnet mask for a given situation.	MAFS.912.N-Q.1.1	
42.10	Use a subnet mask to determine the subnet ID.		
43.0	Recognize, define, and explain functions of the transport layer. – The student will be able to:		
43.01	Describe the functions of the TCP/IP transport layer.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.02	Describe flow control.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.03	Describe the processes of establishing a connection between peer systems.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.04	Describe windowing.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.05	Describe acknowledgment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.06 Identify and describe transport layer protocols.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.07 Describe TCP and UDP header formats.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.08 Describe TCP and UDP port numbers and ports used for services and clients.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.09 List the major protocols of the TCP/IP application layer.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.10 Provide a brief description of the features and operation of well-known TCP/IP applications.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.11 Describe TCP and UDP with its function.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.12 Describe TCP synchronization and flow control.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.13 Describe multiple conversations between hosts.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
43.14 Understand the differences and the relationship between MAC addresses, IP addresses, and port numbers.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
44.0 Explain, define, and identify the components of a WAN and router. – The student will be able to:		
44.01 Identify organizations responsible for WAN standards.		
44.02 Explain the difference between a WAN and LAN and the type of addresses each uses.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
44.03 Describe the role of a router in a WAN.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
44.04 Identify internal components of the router and describe their functions.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
44.05 Describe the physical characteristics of the router.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
44.06 Identify common ports on a router.		
44.07 Properly connect FastEthernet, serial WAN, and console ports.		
45.0 Describe and identify an operating system for a router. – The student will be able to:		
45.01 Describe the purpose of the IOS.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
45.02 Describe the basic operation of the IOS.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
45.03 Identify various IOS features.		
45.04 Identify the methods to establish a CLI session with the router.		
45.05 Move between the user EXEC and privileged EXEC modes.		
45.06 Establish a HyperTerminal session on a router.		
45.07 Log into a router.		
45.08 Use the help feature in the command line interface.		
45.09 Troubleshoot command errors.		
45.10 Name a router.		
45.11 Set passwords.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	45.12 Examine show commands.		
	45.13 Configure a serial interface.		
	45.14 Configure an Ethernet interface.		
	45.15 Execute changes to a router.		
	45.16 Save changes to a router.		
	45.17 Configure an interface description.		
	45.18 Configure a message-of-the-day banner.		
	45.19 Configure host tables.		
	45.20 Understand the importance of backups and documentation.		
46.0	Explain how to establish connections between neighboring routers. – The student will be able to:		
	46.01 Enable and disable Protocols.		
	46.02 Determine which neighboring devices are connected to which local interfaces.		
	46.03 Gather network address information about neighboring devices using CDP.		
	46.04 Establish, Verify, Disconnect, Suspend a Telnet connection.		
	46.05 Perform alternative connectivity tests.		
	46.06 Troubleshoot remote terminal connections.		
47.0	Identify and explain the router boot sequence and file system. – The student will be able to:		
	47.01 Identify the stages of the router boot sequence.		
	47.02 Determine how a router locates and loads its operating system.		
	47.03 Use the boot system command.		
	47.04 Identify the configuration register values.		
	47.05 Briefly describe the files used by the Router IOS and their functions.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112,W.1.2	
47.06 List the locations on the router of the different file types.		
47.07 Briefly describe the parts of the IOS name.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
47.08 Save and restore configuration files using TFTP and copy-and paste.		
47.09 Load an IOS image using TFTP.		
47.10 Verify the file system using show commands.		
48.0 Identify and explain static and dynamic routing protocols. – The student will be able to:		
48.01 Explain the significance of static routing.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
48.02 Configure static and default routes.		
48.03 Verify and troubleshoot static and default routes.		
48.04 Identify the classes of routing protocols.		
48.05 Identify distance vector routing protocols.		
48.06 Identify link-state routing protocols.		
48.07 Describe the basic characteristics of common routing protocols.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
48.08 Identify interior gateway protocols.		
48.09 Identify exterior gateway protocols.		
48.10 Enable Routing Information Protocol (RIP) on a router.		
49.0 Describe and configure distance vector protocols. – The student will be able to:		
49.01 Describe how routing loops can occur in distance vector routing.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
49.02	Describe several methods used by distance vector routing protocols to ensure that routing information is accurate.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
49.03	Configure RIP.		
49.04	Use the IP classless command.		
49.05	Troubleshoot RIP.		
49.06	Configure RIP for load balancing.		
49.07	Configure static routes for RIP.		
49.08	Verify RIP.		
49.09	Configure EIGRP.		
49.10	Verify EIGRP operation.		
49.11	Troubleshoot EIGRP.		
50.0	Perform tasks related to protocol troubleshooting. – The student will be able to:		
50.01	Describe ICMP.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
50.02	Describe the ICMP message format and error message types.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
50.03	Identify potential causes of specific ICMP error messages.		
50.04	Describe ICMP control messages.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
50.05	Identify a variety of ICMP control messages used in networks today.		
50.06	Determine the causes for ICMP control messages.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
51.0	Examine and test networks. – The student will be able to:		
51.01	Use the commands to gather detailed information about the routes installed on the router.		
51.02	Configure a default route or default network.		
51.03	Understand how a router uses both Layer 2 and Layer addressing to move data through the network.		
51.04	Use commands to the router at different OSI layers.		
52.0	Define, explain and describe access lists. – The student will be able to:		
52.01	Describe the differences between standard and extended ACLs.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
52.02	Explain the rules for placement of ACLs.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
52.03	Create and apply named ACLs.		
52.04	Describe the function of firewalls.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
52.05	Use ACLs to restrict virtual terminal access.		
53.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
53.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		
53.02	Locate, organize and reference written information from various sources.		
53.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. Interpret verbal and nonverbal cues/behaviors that enhance communication.		
53.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.		
53.05	Apply active listening skills to obtain and clarify information.		
53.06	Develop and interpret tables and charts to support written and oral communications.		
53.07	Exhibit public relations skills that aid in achieving customer satisfaction.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
54.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
54.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.		
54.02	Employ critical thinking and interpersonal skills to resolve conflicts.		
54.03	Identify and document workplace performance goals and monitor progress toward those goals.		
54.04	Conduct technical research to gather information necessary for decision-making.		
55.0	Use information technology tools. – The student will be able to:		
55.01	Use personal information management (PIM) applications to increase workplace efficiency.		
55.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
55.03	Employ computer operations applications to access, create, manage, integrate, and store information.		
55.04	Employ collaborative/groupware applications to facilitate group work.		
56.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
56.01	Describe the nature and types of business organizations.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
56.02	Explain the effect of key organizational systems on performance and quality.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
56.03	List and describe quality control systems and/or practices common to the workplace.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1, LAFS.910.W.1.2, LAFS.1112.W.1.2	
56.04	Explain the impact of the global economy on business organizations.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
57.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
57.01	Evaluate and justify decisions based on ethical reasoning.		
57.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
57.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
57.04	Interpret and explain written organizational policies and procedures.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Networking 3, Infrastructure**
Course Number: **8207040**
Course Credit: **1**

Course Description:

This course continues the study of network support services. The content includes IT management skills, troubleshooting and diagnostic techniques; network design, devices, topographies, protocols and standards; email and Internet activities, network traffic control and security, and WAN vs. LAN technologies.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Network Support Services.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
	29.03 Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
	29.04 Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Network Support Services.		
	30.01 Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
	30.02 Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Network Support Services.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
58.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:		
58.01 Develop diplomatic methods to communicate with customers.		
59.0 Participate in work-based learning experiences. – The student will be able to:		
59.01 Participate in work-based learning experiences in a network support services environment.		
59.02 Discuss the use of technology in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
60.0 Provide network support and assistance by troubleshooting and diagnosing through direct contact remote access. – The student will be able to:		
60.01 Apply appropriate diagnostic techniques to solve network problems.		
60.02 Perform local network support using various troubleshooting and diagnostic techniques.		
60.03 Perform remote network support using various remote access methods.		
61.0 Develop electronic communications skills. – The student will be able to:		
61.01 Exhibit proficiency in using Internet services.		
61.02 Exhibit proficiency in downloading and uploading Internet information.		
61.03 Perform web-based research to solve specific network problems.		
62.0 Perform logical and physical network design activities. – The student will be able to:		
62.01 Describe the various LAN communication problems.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
62.02 Describe the effects of LAN segmentation with bridges, routers, and switches.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.W.1.2, LAFS.1112,W.1.2	
	62.03 Describe the operation, characteristics and benefits of VLANS.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	62.04 Explain and identify LAN design goals, issues, and methodology.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	62.05 Demonstrate the ability to analyze equipment necessary to meet specific design requirement.		
	62.06 Demonstrate the ability to create physical and logical network implementation documentation.		
63.0	Demonstrate proficiency in selecting appropriate various routing protocols and IP routing configuration for various network designs. – The student will be able to:		
	63.01 Describe the two parts of network addressing, and then identify the parts in specific protocol address examples.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	63.02 Create the different classes of IP addresses (and sub netting).	MAFS.912.N-Q-1.1	
	63.03 Configure IP addresses.		
	63.04 Verify IP addresses.		
	63.05 Identify the functions of the TCP/IP transport-layer protocols.		
	63.06 Identify the functions of the TCP/IP network-layer protocols.		
	63.07 Identify the functions performed by ICMP.		
	63.08 Explain the services of separate and integrated multi-protocol routing.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	63.09 List problems that each routing type encounters when dealing with topology changes and describe techniques to reduce the number of these problems.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
64.0	Demonstrate proficiency in using network traffic filtering to improve network performance and provide basic levels of security. – The student will be able to:		
	64.01 Define and describe the purpose and operation of network traffic filtering.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	64.02 Demonstrate proficiency in using configuration and interface commands to perform and monitor network traffic filtering.		
65.0	Perform network management activities related to documentation, security, performance, administration, troubleshooting and coping with environmental factors. – The student will be able to:		
	65.01 Perform documentation activities for networks, such as logs, journals, diagrams, labeling schemes, layouts, software listings, user policy, security policy.		SC.912.N.1.6-10
	65.02 Plan network security measures by establishing security policies and procedures, including user policies, authentication procedures, back-up and data recovery procedures, and redundancy techniques.		
	65.03 Demonstrate proficiency in using network monitoring software.		
	65.04 Explain the procedures necessary to monitor, create benchmarks, and plan for improvement of network performance.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	65.05 Explain the administrative side of network management, including physical and logical boundaries, costs, error report documentation and the management of human resources.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
66.0	Identify and describe various WAN functions, devices, and demonstrate understanding of the WAN design process. – The student will be able to:		
	66.01 Describe the functions of private addressing and be able to explain the major features of and configure NAT, PAT, and DHCP.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	66.02 Describe the major features of WAN technology, including, devices, standards, encapsulation, link options, and packet and circuit switching.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	66.03 Perform WAN design activities that require using the necessary steps in WAN design, the three-layered design model, and various other design models.		
67.0	Describe the operation and implementation of virtual private networks. – The student will be able to:		
	67.01 Describe the virtual private network operation.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	67.02 Describe the virtual private network implementation.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	67.03 Demonstrate an understanding of tunneling.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	67.04 Describe the end-to-end virtual dialup process.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
68.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
	68.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	SC.912.N.1.1.6
	68.02 Explain emergency procedures to follow in response to workplace accidents.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	SC.912.N.1.1.6
	68.03 Create a disaster and/or emergency response plan.		
69.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
	69.01 Employ leadership skills to accomplish organizational goals and objectives.		
	69.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
	69.03 Conduct and participate in meetings to accomplish work tasks.		
	69.04 Employ mentoring skills to inspire and teach others.		
70.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
	70.01 Identify and demonstrate positive work behaviors needed to be employable.		
	70.02 Develop personal career plan that includes goals, objectives, and strategies.		
	70.03 Examine licensing, certification, and industry credentialing requirements.		
	70.04 Maintain a career portfolio to document knowledge, skills, and experience.	LAFS.910.SL.2.5, LAFS.1112.SL.2.5 LAFS.910.W.2.6, LAFS.1112.W.2.6	
	70.05 Evaluate and compare employment opportunities that match career goals.		
	70.06 Identify and exhibit traits for retaining employment.		
	70.07 Identify opportunities and research requirements for career advancement.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	70.08 Research the benefits of ongoing professional development.		
	70.09 Examine and describe entrepreneurship opportunities as a career planning option.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
71.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:		
	71.01 Identify and describe the services and legal responsibilities of financial institutions.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	71.02 Describe the effect of money management on personal and career goals.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	71.03 Develop a personal budget and financial goals.		
	71.04 Complete financial instruments for making deposits and withdrawals.		
	71.05 Maintain financial records.		
	71.06 Read and reconcile financial statements.		
	71.07 Research, compare and contrast investment opportunities		

Florida Department of Education
Student Performance Standards

Course Title: **Networking 4, Infrastructure**
Course Number: **8207050**
Course Credit: **1**

Course Description:

This course continues the study of network support services. The student will learn to install, configure, and maintain large networks. Student will also be able to demonstrate proficiency in defining, configuring and trouble-shooting the following protocols: IP, EIGRP, Async Routing, Extended Access Lists, IP RIP, Route Redistribution, RIP, Route Summarization, OSPF, VLSM, BGP, Serial, Frame Relay, DSL, ISL, X.25, DDR, PSTN, PPP, VLANs, Ethernet, Access Lists, 802.10, FDDI, Transparent and Translational Bridging installation.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
72.0	Participate in work-based learning experiences. – The student will be able to:		
72.01	Participate in work-based learning experiences in a network support services environment.		
72.02	Discuss the use of technology in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
73.0	Compare and contrast hierarchical network design models and scalable internetworks. – The student will be able to:		
73.01	Show proficiency in the use of the three-layer hierarchical design model.		
73.02	Describe router functions in the core layer, distribution layer, and access layer.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
73.03	Describe key characteristics of making the network reliable, available, responsive, efficient, adaptable, accessible, scalable and secure.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
73.04	Compare and contrast Equal-Cost load balancing with RIP and Unequal-Cost load balancing with EIGRP.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
74.0	Discuss advanced IP addressing management. – The student will be able to:		
74.01	Describe and explain IPv4 addressing, Internet's address architecture, classes of IP addresses, and perform subnet masking.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2 MAFS.912.N-Q.1.1	
74.02	Understand and explain Classless Interdomain Routing (CIDR), route aggregation, supernetting and address allocation.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 MAFS.912.N-Q.1.1	
74.03	Discuss and explain Variable-Length Subnet Masks along with classless and classful routing protocols.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 MAFS.912.N-Q.1.1	
74.04	Compare and contrast route summarization and route flapping.	MAFS.912.N-Q.1.1	
74.05	Describe and discuss Network Address Translation (NAT), private addressing with NAT, private IP addresses (RFC 1918) and discontiguous subnets.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
74.06	Use IP unnumbered and DHCP operations.		
74.07	Configure IOS DHCP server, Easy IP and IP helper addresses.		
74.08	Discuss IP addressing crisis and solutions with IPv6 address formats.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
74.09	Configure IP unnumbered in a lab setting.		
75.0	Demonstrate proficiency in basic router configuration. – The student will be able to:		
75.01	Build ‘Start.TXT’, capture hyperterminal and telnet sessions, create access control list and extended pings, and configure VLSM using routing fundamentals.		
75.02	Configure static routing and dynamic routing using distance-vector routing protocols, link-state routing protocols, and hybrid routing.		
75.03	Configure static default routes and default routing with EIGRP using default route caveats and floating static routes.		
75.04	Describe and explain convergence issues and route calculation fundamentals.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
75.05	Start routing process using various configurations, initiate routing updates and routing metrics.		
75.06	Show proficiency in migrating from RIP to EIGRP.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	75.07 Configuring default routing with RIP and EIGRP, configuring floating static routes.		
76.0	Demonstrate proficiency in the use of OSPF. – The student will be able to:		
	76.01 Discuss issues addressed by the use OSPF, list and define OSPF terminology, list OSPF states and OSPF network types, describe OSPF Hello protocol and Steps of OSPF operation.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	76.02 Establish router adjacencies, elect a DR and a BDR, and discover routes.		
	76.03 Select appropriate routes and maintain routing information, configuring OSPF on routers within a single area.		
	76.04 Use optional configuration commands and configure OSPF over NBMA in a lab setting.		
	76.05 Describe Full-Mesh Frame Relay, Partial-Mesh Frame Relay, Point-to-Multipoint OSPF.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
77.0	Understand and discuss multi-area OSPF operation and configuration. – The student will be able to:		
	77.01 Configure OSPF, examining the DR/BDR election process.		
	77.02 Configure Point-to-Multipoint OSPF over frame relay, create multiple OSPF areas, use OSPF router types, and incorporate OSPF LSA and area types.		
	77.03 Configuring OSPF operation across multiple areas and flooding LSUs to multiple areas, updating the routing table.		
	77.04 Configure Multi-area OSPF, using and configuring OSPF multi-area components, and configuring OSPF route summarization.		
	77.05 Verify OSPF operation, show commands, clear and debug commands.		
78.0	Demonstrate the use of stub and totally stubby areas. – The student will be able to:		
	78.01 Use stub and totally stubby areas.		
	78.02 Set up stub and totally stub area criteria.		
	78.03 Configure stub and totally stubby areas.		
	78.04 Set up an OSPF stub area configuration example.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
78.05 Set up an OSPF totally stubby configuration example.		
78.06 Monitor multi-area OSPF, verifying multi-area OSPF operation.		
78.07 Create a multi-area OSPF.		
79.0 Configure and define virtual links. – The student will be able to:		
79.01 Meet the backbone area requirements.		
79.02 Configure virtual links.		
79.03 Set up a virtual link configuration example.		
79.04 Show not-so-stubby areas.		
79.05 Demonstrate how NSSA operates.		
79.06 Configure a stub area and a totally stubby area.		
79.07 Configure an NSSA and configure virtual links.		
80.0 Demonstrate proficiency in the use of EIGRP. – The student will be able to:		
80.01 Define and explain EIGRP fundamentals, features, components, operations.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
80.02 Configure and monitor EIGRP in lab exercise.		
81.0 Demonstrate proficiency in route optimization. – The student will be able to:		
81.01 Show how to control routing updates, policy routing, and route redistribution.		
81.02 Create a route optimization configuration in lab setting.		
82.0 Demonstrate proficiency in the use of BGP. – The student will be able to:		
82.01 Define and explain autonomous systems and basic BGP operations.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
82.02 Configure and monitor BGP operations and routing process.		
82.03 Define and explain BGP attributes and the BGP decision process.	LAFS.910.L.3.6,	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	82.04 Create BGP configuration in lab setting.		
	82.05 Develop a scaling BGP and route reflectors.		
	82.06 Set up BGP route filtering and policy routing.		
	82.07 Explain the community attribute and peer groups.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	82.08 Explain redundancy, symmetry, and load balancing.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	82.09 Define and explain BGP redistribution.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	82.10 Perform scaling BGP lab exercises and configure BGP in a lab setting.		
83.0	Define and show proficiency in security. – The student will be able to:		
	83.01 Show proficiency in securing router access using access lists.		
	83.02 Show proficiency in using dynamic access lists using lock-and-key.		
	83.03 Show proficiency in session filtering.		
	83.04 Define and explain context-based access control.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	83.05 Use an alternative to access lists.		
	83.06 Configure router security in a lab setting.		
84.0	Using lab equipment, demonstrate the setup, configuration, connectivity of routers to create a small WAN. – The student will be able to:		
	84.01 Demonstrate the use of remote access.		
	84.02 Select appropriate WAN technologies for different scenarios.		
	84.03 Select remote access solutions for different technologies.		
	84.04 Assemble and Cable WAN components.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
85.0	Show the process of using modems and asynchronous dialup connections. – The student will be able to:		
85.01	List, describe and verify modem functions.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
85.02	Configure asynchronous interfaces and terminal lines.		
86.0	Configure and verify PPP configurations. – The student will be able to:		
86.01	Demonstrate the use of PPP authentication, PPP callback, PPP compression, and PPP multilink.		
86.02	Create and verifying PPP configurations.		
87.0	Configure and monitor DSL and DDR. – The student will be able to:		
87.01	Explain and discuss DSL architecture and DSL protocol layers.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
87.02	Configure DSL, static routing and default routing, and DSL PRI.		
87.03	Create optional configurations.		
87.04	Monitor the DSL interface.		
87.05	Create DSL configurations.		
88.0	Configure dialer profiles. – The student will be able to:		
88.01	Demonstrate the use of Legacy DDR.		
88.02	Create and use various dialer profiles.		
88.03	Verify and monitor dialer profiles configurations.		
89.0	Demonstrate proficiency in the understanding of X.25 protocols. – The student will be able to:		
89.01	Define and explain the use of X.25 in modern networks.		
89.02	Compare and contrast X.25 to frame relay.		
90.0	Configure and trouble-shoot frame relay. – The student will be able to:		
90.01	Show proficiency using frame relay concepts.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
90.02 Configure frame relay.		
90.03 Create various frame relay topologies and configurations.		
90.04 Demonstrate proficiency managing frame relay traffic.		
90.05 Show the process of frame relay traffic shaping.		
90.06 Create on demand routing using frame relay.		
90.07 Trouble-shoot frame relay traffic configurations.		
91.0 Demonstrate the use of WAN backup and dial backup. – The student will be able to:		
91.01 Demonstrate dial backup.		
91.02 Demonstrate backup interface operations.		
91.03 Demonstrate routing with the load backup feature.		
91.04 Verifying dial backup configurations in a lab setting.		
91.05 Create various WAN backup configurations in a lab setting.		
92.0 Demonstrate the use of queuing and compression techniques. – The student will be able to:		
92.01 Demonstrate proficiency using various queuing options.		
92.02 Demonstrate proficiency optimizing traffic flow with data compression.		
93.0 Demonstrate the use of scaling IP addresses with NAT. – The student will be able to:		
93.01 Define and explain NAT concepts and terminology.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
93.02 Demonstrate proficiency in configuring, creating and verifying NAT configurations in lab setting.		
94.0 Demonstrate proficiency using AAA to scale access control. – The student will be able to:		
94.01 List and define AAA concepts and terminology.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
94.02 Demonstrate proficiency configuring AAA.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	94.03 Perform lab exercises using access control configurations.		
95.0	Discuss and explain emerging remote-access technologies. – The student will be able to:		
	95.01 List and define features and capabilities of cable, modems, wireless, network access, multichannel multipoint distribution services, local multipoint distribution services, wireless local area networking, very-high-data-rate digital subscriber line (VDSL).	LAFS.910.L.3.6, LAFS.1112.L.3.6	
96.0	Understand and describe key characteristics of various switching technologies, LAN switching and the hierarchical model of network design, and the building-block approach. – The student will be able to:		
	96.01 Discuss the requirements of the evolving campus structure and the issues with traditional network designs.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	96.02 Describe the fundamental campus elements and contributing variables to campus networks.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
	96.03 Compare and contrast the traditional 80/20 rule of network traffic and the new 20/80 rule of network traffic.		
	96.04 Discuss switching and the OSI model, layer 2, 3, and 4 switching, and multiplayer switching.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	96.05 Discuss the core layer, the distribution layer, and the access layer in relation to switching.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	96.06 List and describe the advantages and disadvantages of the building-block approach, scaling the switch block, building the core block and layer 2 and 3 backbone scaling.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
97.0	Understand and describe campus networks, design models, and switching technologies. – The student will be able to:		
	97.01 List and explain key characteristics of various switching technologies.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	97.02 Discuss LAN switching and the hierarchical model of network design.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
	97.03 Show proficiency using the building-block approach to networking.		
98.0	List and describe various types of LAN media. – The student will be able to:		
	98.01 Show proficiency using modem functions and maintaining modem auto-configurations.		
	98.02 Create configurations for asynchronous connections.		
99.0	Show proficiency configuring a switch. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
99.01 Demonstrate the process for initial connectivity to a switch.		
99.02 Show proficiency creating the basic configuration of a switch.		
99.03 List and explain important IOS features.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
100.0 Demonstrate proficiency configuring VLANS. – The student will be able to:		
100.01 Understand and explain VLANs.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
100.02 Discuss VLAN basics and VLAN types.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
100.03 Configure a VLAN in a lab setting.		
100.04 Show use of VLAN identification techniques and VLAN trunking protocol.		
100.05 Create VTP configuration and use VTP pruning.		
101.0 Understand and explain spanning tree protocol (STP) and redundant links. – The student will be able to:		
101.01 Discuss Basic STP Operations and STP Processes.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
101.02 Compare and contrast VLANs and STP.		
101.03 Show how STP is used in the Campus Network.		
101.04 Demonstrate the resolution of Redundant Links.		
102.0 Demonstrate proficiency routing between VLANS. – The student will be able to:		
102.01 Understand and discuss VLAN issues.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
102.02 Route switch modules.		
102.03 Show proficiency using external routers in a lab setting.		
103.0 Demonstrate proficiency with multilayer switching. – The student will be able to:		
103.01 Define and explain MLS Processes.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
103.02 Create basic MLS configurations.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
103.03 Show proficiency using flow masks.		
103.04 Show how to use MLS on the switch.		
104.0 Demonstrate the use of hot standby routing protocol (HSRP). – The student will be able to:		
104.01 Define and explain HSRP operations.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
104.02 Create HSRP configurations in a lab setting.		
105.0 Understand and use IGMP and multicasting. – The student will be able to:		
105.01 Define and explain multicasting.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
105.02 Understand and discuss IGMP.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
105.03 Show proficiency routing multicast traffic.		
105.04 Demonstrate proficiency using multicast routing protocols.		
105.05 Configure IP multicast routing in a lab setting.		
105.06 List and describe optional IP multicast routing tasks.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
106.0 Demonstrate proficiency restricting network access. – The student will be able to:		
106.01 Show proficiency creating networking policies.		
106.02 Discuss and explain basic network security techniques.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
106.03 Demonstrate execution of policy configurations on a set of routers.		
107.0 Demonstrate proficiency using network troubleshooting tools and basic network management diagnostic tools. – The student will be able to:		
107.01 Explain and discuss troubleshooting methodologies and general problem-solving concepts.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
107.02 List and define general considerations in troubleshooting.	LAFS.910.L.3.6, LAFS.1112.L.3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
107.03 Define and explain each component of the general problem-solving model.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
107.04 Demonstrate proficiency using common management and diagnostic tools.		
107.05 Show proficiency using network management software.		
107.06 Demonstrate proficiency using router diagnostic commands.		
107.07 Familiarize logging and error message formats.		
107.08 Demonstrate proficiency interacting with technical support.		
108.0 List and define the commonly used protocols, routing techniques, and switching processes. – The student will be able to:		
108.01 List and define network services, layer 2 LAN protocols, and layer 2 WAN protocols.	LAFS.910.L.3.6, LAFS.1112.L.3.6	
108.02 Trace packets through a router.		
108.03 Define and explain packet switching paths.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
108.04 Identify performance issues affecting packet switching.		
108.05 Define and explain low-level troubleshooting.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
109.0 Demonstrate proficiency troubleshooting TCP/IP, LAN switch environment, VLANS and frame relay. – The student will able to:		
109.01 List, define, and explain theory, concepts, and terminology of TCP/IP, LAN switch environment, spanning tree, VLANs and frame relay.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
109.02 List, define, and explain common problems with TCP/IP and LAN switching.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
109.03 List, define, and explain common scenarios with VLANs and frame relay.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
109.04	Troubleshoot TCP/IP in a Windows environment; use LAN switch troubleshooting tools, explain general VLAN troubleshooting issues; list and explain the steps in frame relay troubleshooting and DSL problem isolation.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
109.05	Use show commands to verify LAN switch configuration settings.		
109.06	Use show and debug commands for TCP/IP, router VLANs and frame relay.		
109.07	Use TCP/IP diagnostic tools.		
110.0	Demonstrate proficiency troubleshooting EIGRP, OSPF, and BGP. – The student will be able to:		
110.01	List, define, and explain theory, concepts, and terminology of EIGRP, OSPF, and BGP.	LAFS.910.L.3.6, LAFS.1112.L.3.6 LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
110.02	Demonstrate proficiency configuring AAA, EIGRP, OSPF, and BGP.		
110.03	Demonstrate proficiency trouble shooting EIGRP, OSPF, and BGP.		
110.04	Demonstrate proficiency using the show and debug commands for OSPF and BGP.		

Florida Department of Education
Student Performance Standards

Course Title: **Networking 5**
Course Number: **8207060**
Course Credit: **1**

Course Description:

This course continues the study of network support services. The content includes wireless networking technologies, implementation, management and security.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
111.0 Participate in work-based learning experiences. – The student will be able to:		
111.01 Participate in work-based learning experiences in a network support services environment.		
111.02 Discuss the use of technology in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
111.03 Discuss the management/supervisory skills needed in a network support service environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
112.0 Demonstrate proficiency in applying radio frequency (RF) technologies. – The student will be able to:		
112.01 Define and apply the basic concepts of RF behavior.	LAFS.910.L.3.6, LAFS.1112.L.3.6	SC.912.P.10.17, SC.912.P.10.18, SC.912.E.5.8
112.02 Understand the applications of basic RF antenna concepts.		
112.03 Understand and apply the basic components of RF.		SC.912.P.10.17, SC.912.P.10.18, SC.912.E.5.8
112.04 Identify some of the different uses for spread spectrum technologies.		SC.912.P.10.18, SC.912.E.5.8
112.05 Comprehend the differences between, and apply the different types of spread spectrum technologies.		SC.912.P.10.18
112.06 Identify and apply the concepts which make up the functionality of spread spectrum technology.		SC.912.P.10.18

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
112.07	Identify the laws set forth by the FCC that govern spread spectrum technology, including power outputs, frequencies, bandwidths, hop times, and dwell times.		
113.0	Develop an awareness of wireless LAN technologies. – The student will be able to:		
113.01	Identify and apply the processes involved in authentication and association.		SC.912.P.10.18
113.02	Recognize the concepts associated with wireless LAN service sets.		
113.03	Understand the implications of the following power management features of wireless LANs.		
113.04	Specify the modes of operation involved in the movement of data traffic across wireless LANs.		SC.912.P.10.18
114.0	Perform implementation and management activities. – The student will be able to:		
114.01	Identify the technology roles for which wireless LAN technology is an appropriate technology application.		
114.02	Identify the purpose of infrastructure devices and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
114.03	Identify the purpose of wireless LAN client devices and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
114.04	Identify the purpose of wireless LAN gateway devices and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
114.05	Identify the basic attributes, purpose, and function of types of antennas.		
114.06	Describe the proper locations and methods for installing antennas.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
114.07	Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antennas.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
114.08	Identify the use of wireless LAN accessories and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
114.09	Identify, understand, correct or compensate for wireless LAN implementation challenges.		
114.10	Explain how antenna diversity compensates for multipath.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
114.11	Identify and understand the importance and process of conducting a thorough site survey.		
114.12	Identify and understand the importance of the necessary tasks involved in preparing to do an RF site survey.		
114.13	Identify the necessary equipment involved in performing a site survey.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
114.14 Understand the necessary procedures involved in performing a site survey.		
114.15 Identify and understand site survey reporting procedures.		
115.0 Develop an awareness of wireless security systems. – The student will be able to:		
115.01 Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques.		
115.02 Describe types of wireless LAN security attacks, and explain how to identify and prevent them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
115.03 Given a wireless LAN scenario, identify the appropriate security solution from the following available wireless LAN security solutions.		
115.04 Explain the uses of corporate security policies and how they are used to secure a wireless LAN.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
115.05 Identify how and security precautions are used to secure a wireless LAN.		
116.0 Demonstrate knowledge of wireless industry standards. – The student will be able to:		
116.01 Identify, apply and comprehend the differences between wireless LAN standards.		SC.912.P.10.18
116.02 Understand the roles of organizations in providing direction and accountability within the wireless LAN industry.		
116.03 Identify the differences between the ISM and UNII bands.		
116.04 Identify and understand the differences between the power output rules for point-to-point and point-to-multipoint links.		
116.05 Identify the basic characteristics of infrared wireless LANs.		SC.912.P.10.18

Florida Department of Education
Student Performance Standards

Course Title: **Networking 6**
Course Number: **8207070**
Course Credit: **1**

Course Description:

This course continues the study of network support services. The content includes network security.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
117.0 Participate in work-based learning experiences. – The student will be able to:		
117.01 Participate in work-based learning experiences in a network support services environment.		
117.02 Discuss the use of technology in a network support services environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
117.03 Discuss the management/supervisory skills needed in a network support service environment.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
118.0 Demonstrate proficiency in applying radio frequency (RF) technologies. – The student will be able to:		
118.01 Define and apply the basic concepts of RF behavior.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
118.02 Understand the applications of basic RF antenna concepts.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
118.03 Understand and apply the basic components of RF.		
118.04 Identify some of the different uses for spread spectrum technologies.		
118.05 Comprehend the differences between, and apply the different types of spread spectrum technologies.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
118.06	Identify and apply the concepts which make up the functionality of spread spectrum technology.		
118.07	Identify the laws set forth by the FCC that govern spread spectrum technology, including power outputs, frequencies, bandwidths, hop times, and dwell times.		
119.0	Develop an awareness of wireless LAN technologies. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
119.01	Identify and apply the processes involved in authentication and association.		
119.02	Recognize the concepts associated with wireless LAN service sets.		
119.03	Understand the implications of the following power management features of wireless LANs.		
119.04	Specify the modes of operation involved in the movement of data traffic across wireless LANs.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
120.0	Perform implementation and management activities. – The student will be able to:		
120.01	Identify the technology roles for which wireless LAN technology is an appropriate technology application.		
120.02	Identify the purpose of infrastructure devices and explain how to install, configure, and manage them.		
120.03	Identify the purpose of wireless LAN client devices and explain how to install, configure, and manage them.		
120.04	Identify the purpose of wireless LAN gateway devices and explain how to install, configure, and manage them.		
120.05	Identify the basic attributes, purpose, and function of types of antennas.		
120.06	Describe the proper locations and methods for installing antennas.		
120.07	Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antennas.		
120.08	Identify the use of wireless LAN accessories and explain how to install, configure, and manage them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
120.09	Identify, understand, correct or compensate for wireless LAN implementation challenges.		
120.10	Explain how antenna diversity compensates for multipath.	MAFS.912.A-REI.2.3	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
120.11	Identify and understand the importance and process of conducting a thorough site survey.		
120.12	Identify and understand the importance of the necessary tasks involved in preparing to do an RF site survey.		
120.13	Identify the necessary equipment involved in performing a site survey.		
120.14	Understand the necessary procedures involved in performing a site survey.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
120.15	Identify and understand site survey reporting procedures.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
121.0	Develop an awareness of wireless security systems. – The student will be able to:		
121.01	Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
121.02	Describe types of wireless LAN security attacks, and explain how to identify and prevent them.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
121.03	Given a wireless LAN scenario, identify the appropriate security solution from the following available wireless LAN security solutions.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
121.04	Explain the uses of corporate security policies and how they are used to secure a wireless LAN.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
121.05	Identify how and security precautions are used to secure a wireless LAN.	LAFS.910.SL.1.1, LAFS.1112.SL.1.1	
122.0	Demonstrate knowledge of wireless industry standards. – The student will be able to:	LAFS.910.SL.1.1, LAFS.1112.SL.1.1 LAFS.910.W.1.2, LAFS.1112,W.1.2	
122.01	Identify, apply and comprehend the differences between wireless LAN standards.		
122.02	Understand the roles of organizations in providing direction and accountability within the wireless LAN industry.		
122.03	Identify the differences between the ISM and UNII bands.		
122.04	Identify and understand the differences between the power output rules for point-to-point and point-to-multipoint links.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
122.05 Identify the basic characteristics of infrared wireless LANs.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Game/Simulation/Animation Visual Design**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8208100
CIP Number	0550041114
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @7 7G DIGI MEDIA 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other 27-1014 – Multimedia Artists and Animators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of project-based courses that provide coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster such as Game or Simulation Designer, Game or Simulation Graphic Artist, and Game or Simulation 3-D Animator; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to practical experiences in game/simulation conceptualization, design, storyboarding, development methodologies, 2D/3D animation design and production, and implementation issues. Specialized skills involving graphic animation software are used to produce a variety of two and three dimensional components.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8207310	Digital Information Technology **OR**	1 credit	15-1199	2	PA
	8208110	Game & Simulation Foundations	1 credit		2	VO
	8208120	Game & Simulation Design	1 credit		2	VO
B	8208130	Game & Simulation 2D Graphic Development	1 credit	27-1014	2	VO
C	8208140	Game & Simulation 3D Graphic Animation	1 credit	27-1014	2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
8208110	1/87 1%	14/80 18%	23/83 28%	9/69 13%	28/67 42%	6/70 9%	2/69 3%	28/82 34%	9/66 14%	34/74 46%	16/72 22%
8208120	6/87 7%	18/80 23%	27/83 33%	13/69 19%	31/67 46%	13/70 19%	6/69 9%	31/82 38%	12/66 18%	41/74 55%	20/72 28%
8208130	20/87 23%	21/80 26%	1/83 1%	20/69 29%	2/67 3%	20/70 29%	20/69 29%	1/82 1%	15/66 23%	2/74 3%	21/72 29%
8208140	20/87 23%	21/80 26%	1/83 1%	20/69 29%	2/67 3%	20/70 29%	20/69 29%	1/82 1%	15/66 23%	2/74 3%	21/72 29%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
8208110	14/67 21%	9/75 12%	13/54 24%	#	#	#	#
8208120	16/67 24%	11/75 15%	17/54 31%	7/46 15%	7/45 16%	7/45 16%	7/45 16%
8208130	11/67 16%	14/75 19%	11/54 20%	#	#	#	#
8208140	8/67 12%	14/75 19%	10/54 19%	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Program Recommendations

The Game, Simulation and Animation Visual Design program lends itself to integration of the core academic subjects of language arts, math, science, visual arts, and social studies into project activities. It is through a balanced and integrated curriculum that students attain the attitudes, skills, and knowledge needed to compete successfully in today's work force. To achieve total curriculum integration, academic and career and technical education teachers should be scheduled with common planning times.

This program emphasizes the development of technical abilities as well as ethical and societal awareness necessary to function in a highly technological society. The use of cooperative learning groups is recommended. By learning and practicing group process skills, students will be prepared to work "together" in real work situations. Program graduates will develop enhanced self-esteem as well as the problem solving and teamwork skills necessary to succeed in careers and postsecondary education.

The Game, Simulation & Animation Visual Design program places a strong emphasis on workplace learning. Job shadowing and mentoring experiences with game and simulation professionals along with on-site trips to local businesses connect classroom learning to the workplace. In-class guest speakers bring the real world into the classroom.

The Foundations and Design courses should be taken in sequence prior to the 2D Graphic Development and 3D Graphic Animation courses. The 2D Graphic Development and 3D Graphic Animation courses may be taken concurrently. Digital Information Technology may be taken concurrently with either the Foundations course or the Design course.

The Game/Simulation/Animation Advanced Applications program (8208400) is an appropriate follow-on capstone program.

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game.
19.0 Use information technology tools.
20.0 Design and create a playable game.
21.0 Categorize the different gaming genres.
22.0 Categorize different gaming platforms.
23.0 Understand the historical significance of electronic and non-electronic games.
24.0 Describe the trends in current and future game development.
25.0 Identify the business model commonly used in game development industries.
26.0 Examine and categorize the significant processes in the production of games.
27.0 Understand the core tasks and challenges that face a video game design team.
28.0 Identify legal issues that affect games, developers and players.
29.0 Demonstrate the professional level of written and oral communication required in the game development industry.

30.0 Investigate career opportunities in the game industry.
31.0 Demonstrate an understanding of the vocabulary of the industry for discussing games and play.
32.0 Demonstrate research and information fluency.
33.0 Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design.
34.0 Identify popular games and identify commonality between them.
35.0 Understand the general procedure and requirements of game design.
36.0 Explore the methods used to create and sustain player immersion.
37.0 Become familiar with popular game tools such as DirectX, 3DMax, and different gaming engines.
38.0 Demonstrate language arts knowledge and skills.
39.0 Demonstrate mathematics knowledge and skills.
40.0 Demonstrate science knowledge and skills.
41.0 Create a working game or simulation individually or as part of a team.
42.0 Describe the game development life cycle.
43.0 Identify hardware constraints on video games including processors and I/O devices.
44.0 Understand the general principles of storytelling.
45.0 Understand character archetypes and character design.
46.0 Understand the use of storyboarding in game design.
47.0 Develop a game design document or cut.
48.0 Understand outlining in game designs.
49.0 Explore elements of puzzle design.
50.0 Discuss game designer strategy considerations.
51.0 Understand the process of creating and designing player choice.
52.0 Create and design the game flow as it relates to story and plot.
53.0 Assess common principles and procedures in game flow design.
54.0 Describe rule creation elements of player challenge.
55.0 Identify tools and software commonly used in game development.
56.0 Understand the technical methodologies for integrating digital media into a game or simulation.
57.0 Identify commonly used art and animation production tools in the game design industry.
58.0 Understand the general concepts of environmental design.
59.0 Describe how environmental design is used in conjunction with game level design.
60.0 Describe pertinent issues facing game designers.
61.0 Describe Monte Carlo simulation as it relates to game design.
62.0 Understand the use of inventory systems in game design.
63.0 Use information technology tools.
64.0 Describe the roles within a game studio.
65.0 Describe the importance of professional ethics and legal responsibilities.
66.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Visual Design.
67.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Visual Design.
68.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Visual Design.

69.0 Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 2D game graphics.
70.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets.
71.0 Understand the various job titles and responsibilities of a 2D artist as it relates to the game industry.
72.0 Develop the art direction for a 2D game.
73.0 Determine and document the graphical and animation needs of a game using design documents including art direction and reference materials.
74.0 Understand the fundamentals of drawing and painting techniques.
75.0 Demonstrate a working knowledge of vector and paint programs used to make 2D graphics and animation.
76.0 2D world building, making graphics and backgrounds for 2D side scrolling, top down, and Isometric projection.
77.0 Understand the principles of Sprite animation as it relates to 2D game graphics (walk, run, Jump, idle).
78.0 Facial animation, expressions, and audio lip syncing.
79.0 Create graphics for the user interface including titles and button states.
80.0 Effects design and other in-game effects such as lighting and shadows.
81.0 Demonstrate the effective use art input devices.
82.0 Demonstrate leadership and teamwork skills needed, as it relates to game/simulation development, to accomplish team goals and objectives.
83.0 Explain the importance of employability skill and entrepreneurship skills as it relates to game/simulation development.
84.0 Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 3D game graphics.
85.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets.
86.0 Understand the various job titles and responsibilities of a 3D artist as it relates to the game industry.
87.0 Develop the art direction for a 3D game.
88.0 Determine and document the graphical and animation needs of a game using design documents including art direction and reference materials.
89.0 Understand the fundamentals of drawing and painting techniques.
90.0 Demonstrate a working knowledge of modeling and paint programs used to make 3D graphics and animation.
91.0 3D world building, making graphics and backgrounds for 3D side scrolling, top down, and Isometric projection.
92.0 Understand the principles of Sprite animation as it relates to 3D game graphics (walk, run, Jump, idle).
93.0 Facial animation, expressions, and audio lip syncing.
94.0 Create graphics for the user interface including titles and button states.
95.0 Particle system design and other in-game effects such as lighting and shadows.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Foundations**
Course Number: **8208110**
Course Credit: **1**

Course Description:

This course is designed to provide an introduction to game and simulation concepts and careers, the impact game and simulation has on society and industry, and basic game/simulation design concepts such as rule design, play mechanics, and media integration. This course compares and contrasts games and simulations, key development methodologies and tools, careers, and industry-related information. This course also covers strategies, processes, and methods for conceptualizing a game or simulation application; storyboarding techniques; and development tools.

Hands-on activities using an entry-level game development tool should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation of a playable game.**

Game & Simulation Creation

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
01.01	Key Ideas and Details		
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1		
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2		
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3		
01.02	Craft and Structure		

Florida Standards			Correlation to CTE Program Standard #
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
02.02.1		Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2		Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3		Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
02.03.1		Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2		Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3		Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
02.04.1		Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		

Florida Standards	Correlation to CTE Program Standard #
03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game. – The student will be able to:		
18.01 Use industry standard game design production documents to create a game design production plan.		SC.912.N.1.1
19.0 Use information technology tools. – The student will be able to:		SC.912.P.10.1; 10.2; 10.5; 10.16; 12.2
19.01 Use personal information management (PIM) applications to increase workplace efficiency.		
19.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
20.0 Design and create a playable game. – The student will be able to:		
20.01 Use a number of computer tools to enhance and ease game programming and artistry.		
20.02 Use a game engine to create a playable game.		SC.912.N.1.1
20.03 Use animated objects.		SC.912.N.1.1
20.04 Integrate sound and music to enhance the game experience.		SC.912.N.3.5
20.05 Test and debug to game completion.		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
21.0	Categorize the different gaming genres. – The student will be able to:		
21.01	Research, compare and categorize the different gaming genres.		SC.912.L.15.4
21.02	Analyze examples of different gaming genres.		SC.912.L.15.6
21.03	Define and use the necessary vocabulary related to gaming and the different genres.		
22.0	Categorize different gaming platforms. – The student will be able to:		
22.01	Research, compare and categorize different gaming platforms.		SC.912.N.1.1
22.02	Analyze the distinctive features of each system.		SC.912.L.15.6
22.03	Define the target audience for different platforms based on features, available games, and price of system and games.		
22.04	Define and use the necessary vocabulary related to gaming platforms.		
23.0	Understand the historical significance of electronic and non-electronic games. – The student will be able to:		SC.912.P.10.18; 10.20
23.01	Discuss the history of non-electronic games.		SC.912.N.3.2
23.02	Describe the history and theory of mainstream and experimental media including radio, movies, television, art, and theatre.		SC.912.N.2.4
23.03	Explain the historical timeline of electronic games, marking the significant highlights in their evolution.		
24.0	Describe the trends in current and future game development. – The student will be able to:		SC.912.N.1.7; .3.5; SC.912.P.10.2; 10.10; 12.2; 12.3; 12.5; 12.6
24.01	Determine and analyze the significant trends in game development in the past two decades.		SC.912.N.1.1
24.02	Research and brainstorm the possibilities for the future of electronic games based on current and emerging technologies and future predictions.		SC.912.N.1.1
25.0	Identify the business model commonly used in game development industries. – The student will be able to:		
25.01	Identify, define and discuss the different ways games are funded, marketed and sold.		
25.02	Identify and describe licensing management for different gaming platforms.		
25.03	Discuss the product value and business differences between major game platforms.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
25.04	Identify successful business models and analyze various facets of those models, such as market analysis, marketing strategy, and product value.		
25.05	Discuss the opportunities available to independent game developers and entrepreneurs in the mobile application market.		
26.0	Examine and categorize the significant processes in the production of games. – The student will be able to:		SC.912.N.1.1; 1.5
26.01	Discuss the relationships between publishers, developers, distributors, marketers, and retailers.		
26.02	Identify processes of development including content creation, team roles, design documentation, and process management.		
26.03	Explore and describe the effects of globalization on the design and production of video games.		
27.0	Understand the core tasks and challenges that face a video game design team. – The student will be able to:		SC.912.N.1.1
27.01	Identify and define the roles and responsibilities of team members on a video game design team.		SC.912.L.14.2
27.02	Describe the effects of group dynamics and the importance of team building for a design team.		
27.03	Explore and discuss methods of communications and scheduling for design teams.		
27.04	Describe the importance and interrelationship between development schedule and budget constraints in video game design.		
28.0	Identify legal issues that affect games, developers and players. – The student will be able to:		
28.01	Define and discuss intellectual property and contract law as it relates to the gaming industry.		
28.02	Describe legal and liability issues that could affect online communities.		SC.912.N.1.3
28.03	Compare and contrast government and industry content regulation and industry ratings of video games.		
29.0	Demonstrate the professional level of written and oral communication required in the game development industry. – The student will be able to:		SC.912.N.1.1
29.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.		SC.912.N.1.1
29.02	Organize ideas and communicate oral and written messages appropriate for the game development industry environment.		SC.912.N.1.1
29.03	Identify, define, and discuss terminology appropriate for both internal and external communications in the game development industry environment.		
29.04	Compose electronic documents used to facilitate formal and informal communication in the game industry such as letters, reports, memos, emails, presentations, budgets,		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	charts and calendars.		
30.0	Investigate career opportunities in the game industry. – The student will be able to:		SC.912.N.4.2
30.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.		
30.02	Analyze job and career requirements and relate career interests to opportunities in the global economy.		
30.03	Describe job requirements for a variety of occupations within the game development industry.		
30.04	Identify current employment trends and career opportunities in the game industry.		
30.05	Evaluate personal aptitude and skills to match specific employment opportunities.		
30.06	Develop an educational plan to acquire the skills and requirements of a selected employment opportunity within the game industry.		
31.0	Demonstrate an understanding of the vocabulary of the industry for discussing games and play. – The student will be able to:		
31.01	Identify, define, and discuss professional game design and analysis terminology appropriate for internal and external communications in a game design environment.		
31.02	Identify and define the vocabulary used by game players and online gaming communities.		
32.0	Demonstrate research and information fluency. - The student will be able to:		
32.01	Locate, analyze, process, and organize data from multiple sources including the Internet.		
32.02	Play games to research and collect game play data.		
32.03	Evaluate, analyze and document game styles and playability.		
32.04	Determine the dramatic elements in games, including kinds of fun, player types and nonlinear storytelling.		
33.0	Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow and game design. – The student will be able to:		
33.01	Test and analyze games to determine the quality of rules, interfaces, navigation, performance, play, artistry and longevity in design and structure.		SC.912.N.1.1
33.02	Research and evaluate the game analysis techniques used by the video game industry.		SC.912.N.1.1
33.03	Identify the key elements in a game and make intelligent judgments about whether the game succeeded or failed in its objectives.		SC.912.N.1.1
33.04	Evaluate professional reviews and write a critical analysis of a current video game.		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
34.0	Identify popular games and identify commonality between them. – The student will be able to:		
34.01	Analyze and deconstruct game environments and interactions.		SC.912.N.1.1
34.02	Compare and contrast the top selling video games in terms of player interaction, plot complexity, and reward.		
34.03	Categorize gameplay elements by player type. (killer, talker, explorer and achiever)		
35.0	Understand the general procedure and requirements of game design. – The student will be able to:		SC.912.N.1.7
35.01	Describe the design process from conception to production.		SC.912.N.1.1
35.02	Explain the iterative nature of game design through the different stages of design iterations including pre-alpha, alpha, beta, release candidate, going gold and support.		
35.03	Develop design plans, for example, character sketches, documentation and storyboards for proposed games.		
36.0	Explore the methods used to create and sustain player immersion. – The student will be able to:		
36.01	Research and define the term “player immersion”.		
36.02	Explore and explain the factors that create player immersion in a game.		
36.03	Examine popular games and explain the methods each game uses to increase player immersion.		
37.0	Become familiar with popular game technology such as DirectX, 3DMAX, and different gaming engines. – The student will be able to:		
37.01	Identify and discuss the popular game development tools currently used in the industry.		
37.02	Identify and discuss popular gaming engines.		
37.03	Research and analyze the uses for different game development tools.		SC.912.N.1.1
38.0	Demonstrate language arts knowledge and skills. – The student will be able to:		
38.01	Locate, comprehend and evaluate key elements of oral and written information.		SC.912.N.1.1
38.02	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
38.03	Present information formally and informally for specific purposes and audiences.		SC.912.N.1.1
39.0	Demonstrate mathematics knowledge and skills. – The student will be able to:		
39.01	Demonstrate knowledge of arithmetic operations.		SC.912.P.10.3

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
39.02	Analyze and apply data and measurements to solve problems and interpret documents.		SC.912.N.1.1
39.03	Construct charts/tables/graphs using functions and data.	MAFS.912.F-IF.3.7	SC.912.N.1.1
40.0	Demonstrate science knowledge and skills. – The student will be able to:		
40.01	Discuss the role of creativity in constructing scientific questions, methods and explanations.		SC.912.N.1.7
40.02	Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.		SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Design**
Course Number: **8208120**
Course Credit: **1**

Course Description:

This course covers fundamental principles of designing a game or a simulation application, rules and strategies of play, conditional branching, design and development constraints, use of sound and animation, design tools, and implementation issues. The content includes market research, product design documentation, storyboarding, proposal development, and presentation of a project report. Emphasis is placed on the techniques needed to develop well-documented, structured game or simulation programs. Extensive use is made of evaluating and analyzing existing games or simulations.

Hands-on activities using an entry-level game development tool should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation and presentation of a playable game <u>with</u> design documentation.**

<u>Game/Simulation Project</u>

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

Florida Standards				Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in[Game/Simulation/Animation Visual Design.			
	01.01	Key Ideas and Details		
		01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
		01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
		01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02	Craft and Structure		
		01.02.1	Determine the meaning of symbols, key terms, and other domain-specific	

Florida Standards			Correlation to CTE Program Standard #
		words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards			Correlation to CTE Program Standard #
	02.02	Production and Distribution of Writing	
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
41.0 Create a working game or simulation individually or as part of a team. – The student will be able to:		SC.912.N.1.1
41.01 Create a storyboard describing the essential elements, plot, flow, and functions of the game/simulation.	MAFS.912.G-MG.1.3	
41.02 Create a design specification document to include interface and delivery choices, rules of play, navigation functionality, scoring, media choices, start and end of play, special features, and development team credits.		
41.03 Using a simple game development tool, create a game or simulation.		SC.912.N.3.5
41.04 Present the game or simulation.		SC.912.N.3.5
42.0 Describe the game development life cycle. – The student will be able to:		SC.912.P.10.13; 10.14; 10.15; 10.18
42.01 Identify steps in the pre-production process including the proof of concept and market research.		
42.02 Describe the iterative prototyping process – Alpha, Beta, RTM.		
42.03 Determine platform, technology and scripting requirements.		
42.04 Implement techniques of scenario development, levels, and missions.		
42.05 Discuss game testing requirements and methods.		SC.912.N.1.1
42.06 Identify and describe maintenance, upgrade and sequel issues.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
43.0	Identify hardware constraints on video games including processors and I/O devices. – The student will be able to:		
43.01	Identify the different control systems for video games.		
43.02	Compare and contrast personal computer and video game console hardware, including display systems.	MAFS.912.S-CP.1.1	
43.03	Explain the factors that can limit the game-playing ability of personal computers.		SC.912.L.17.5
44.0	Understand the general principles of storytelling. – The student will be able to:		
44.01	Identify the essential elements of a story.		
44.02	Describe how creative writing is used as a game design tool.		
44.03	Compare and contrast methods of delivering a story in a game.		
45.0	Understand character archetypes and character design. – The student will be able to:		
45.01	Research and identify common character archetypes used in computer games.		
45.02	Design character prototypes to physically match archetype.		
45.03	Apply symbolize and semiotic design elements within character design to convey meaning.		
45.04	Create character backstory and profile.		
46.0	Understand the use of storyboarding in game design. – The student will be able to:		
46.01	Assess the techniques used in the gaming industry for rendering basic Game Design Art.		
46.02	Describe how game layout charts are used in game design.		
46.03	Describe how storyboards in the game design process can be used as a pre-development sales tool.		
46.04	Analyze and compare the use of storyboards in the game design industry with regard to environmental illustrations, level designs, character designs, model sheets and GUI Designs.		
47.0	Develop a game design document or cut. – The student will be able to:		
47.01	Evaluate and discuss the choice of delivery system.		
47.02	Evaluate and discuss choices of genre, game design software, art, digital media, and animation software.		
47.03	Create a game strategy overview, character overview, and storyboard overview.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
47.04	Define the rules of play and multi-player options.		
47.05	Create the layout and interfaces overview and digital media overview.	MAFS.912.G-MG.1.3	
47.06	Determine the gameplay interaction requirements and create the progression levels overview.		
47.07	Define strategic positioning of game immersion dynamics and psychological effect.		SC.912.N.1.1
47.08	Identify hardware and software constraints.		SC.912.L.17.5
48.0	Understand outlining in game designs. – The student will be able to:		
48.01	Assess techniques of goal design in gaming.		
48.02	Describe the concept of nested victories.		
48.03	Discuss the use of players as agents of change.		
48.04	Compare and contrast examples of understandable context in gaming.		
48.05	Discuss the principles underlying the creation of understandable rules.		
48.06	Describe how skill building is used in game design.		
48.07	Describe conventional techniques of positive feedback.		
48.08	Discuss functional consistency as it relates to the use of interfaces.		
49.0	Explore elements of puzzle design. – The student will be able to:		SC.912.P.10.14; 10.15.
49.01	Describe the essential elements of a puzzle.		
49.02	Identify the different types of puzzles.		
49.03	Describe the basic principles of high-level puzzle design.		
49.04	Describe the basic principles of low-level puzzle design.		
50.0	Discuss game designer strategy considerations. – The student will be able to:		SC.912.L.17.15
50.01	Describe the use of artificial intelligence challenges in game design and the need for giving the player rest time between challenges.		
50.02	Evaluate the impact of randomness in game design especially as it pertains to pattern recognition.	MAFS.912.S-MD.1.1 MAFS.912.S-MD.1.2	
50.03	Identify techniques used in the industry to help the player to navigate.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
50.04	Explain the use of “just barely” victories and failures as an exciting and immersive technique.		
50.05	Assess techniques used to provide a range of challenges and appeal to a wide range of abilities.		
50.06	Describe the psychological cost of failure in games as it pertains to immersion and psychological effect.		
50.07	Identify methods of preparing the player for greater challenge while allowing for plot development as the story serves the game.		
51.0	Understand the process of creating and designing player choice. – The student will be able to:		
51.01	Discuss the principles of player-centric design.		
51.02	Research and correlate game complexity level to appropriate age group such that content matches user skill set required.		SC.912.N.1.1
51.03	Examine and discuss design elements that encourage continuous active engagement both mental and physical.		
51.04	Analyze design elements that maintain player interest and vary the degree of challenge.		SC.912.N.1.1
51.05	Discuss the need for a balance of design elements for the purpose of rewarding and frustrating players.		
52.0	Create and design the game flow as it relates to story and plot. – The student will be able to:		
52.01	Identify techniques of introducing the story plot and beginning play.		
52.02	Describe story plot development techniques for the middle of play in game design.		
52.03	Analyze and discuss planning techniques for climax and finale of games.		
53.0	Assess common principles and procedures in game flow design. – The student will be able to:		
53.01	Assess missions and scenarios game flow techniques.		
53.02	Describe common use of mission design and campaigns.		
53.03	Evaluate usage of static versus dynamic campaigns.		
54.0	Describe player challenge rule creation elements. – The student will be able to:		
54.01	Research common design methods for clearing obstacles or series of obstacles.		SC.912.N.1.1
54.02	Describe common design elements introducing skill, luck and combinations including escalating challenges to games.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
54.03	Identify common design elements used to vary weapons, characters and tools.		
54.04	Discuss the incorporation of risk reward and adaptive challenges (AI).		
54.05	Evaluate industry use of boss encounters in games.		
54.06	Analyze and discuss design considerations from the perspective of other players and multi-player environments.		
55.0	Identify tools and software commonly used in game development. – The student will be able to:		
55.01	Identify and discuss the popular game development tools currently used in the industry.		
55.02	Identify and discuss popular gaming engines.		
55.03	Identify and discuss popular world building tools.		
56.0	Understand the technical methodologies for integrating digital media into a game or simulation. – The student will be able to:		
56.01	Survey and discuss the use of naming conventions and temp sounds.		
56.02	Analyze and discuss methods of matching sound effects to art assets.		
56.03	Identify and categorize commonly used technology sound engine integration equipment.		
56.04	Identify and discuss resources such as sound effects libraries.		SC.912.P.10.21
56.05	Examine methods of sound implementation and associated software.		
56.06	Describe how and why digital video may be integrated into a game or simulation design.		
56.07	Describe how special effects differ from animation.		
57.0	Identify commonly used art and animation production tools in the game design industry. – The student will be able to:		
57.01	Identify, categorize and discuss art and animation tools commonly used in game design.		
58.0	Understand the general concepts of environmental design. – The student will be able to:		
58.01	Survey and evaluate commonly used concept art.		
58.02	Create a world sketch with particular attention to maintaining continuity of style.		
58.03	Describe the emotional/psychological aspects of environmental design that signify mood, façade of freedom, and resource struggling.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
59.0	Describe how environmental design is used in conjunction with game level design. – The student will be able to:		
59.01	Examine and evaluate examples of focus on a theme.		
59.02	Describe methods of creating a purposeful architecture giving consideration to continuity and themes and taking advantage of revisiting.		
59.03	Consider and discuss environmental design elements for multi-player or single player games.		
59.04	Describe the history of creating shifts in game design environments and embracing novel ideas.		
59.05	Identify and discuss environmental design pitfalls such as red herrings and cookie-cutter layouts.		
60.0	Describe pertinent issues facing game designers. – The student will be able to:		
60.01	Discuss the meaning of simulation and give examples of simulation and complexity including architecture, exposure, concealment and heuristics.		
60.02	Describe applied event modeling including goal discovery, map making, event exploration, developing incentives and learning in event modeling for games.		
60.03	Explain the concepts of modes of understanding, inductive and iconic logic, significance and saturation in event modeling for game design.		
61.0	Describe Monte Carlo simulation as it relates to game design. – The student will be able to:		SC.912.P.8.7; 10.1; 10.2; 10.4; 10.5; 10.10; 12.3; 12.4; 12.5; 12.6; SC.912.L.14.16; 17.5; 17.15; SC.912.N.1.7
61.01	Discuss the process of specifying events including contexts of simulation, translating event models to simulations, formalizing thematic objectives, prototyping, interface design and use cases with modeling.		
61.02	Discuss the process of designing entities including behavior and entity graphics.		
61.03	Describe the implementation of entities including enumerating animations, playing with time, creating events, adding an entity class, and creating entity events and behaviors.		
61.04	Analyze event modeling in creating a world including the creation of a world class, adding and removing entities, accessing entities, updating and rendering, adding scene hierarchies and handling world events.		
61.05	Assess and discuss AI and physics issues for simulation including AI event contexts, adding intelligence and gravity, adding collision detection, updating for collisions and applying mass and force.		SC.912.P.10.6, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.12.4, SC.912.P.12.5

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
61.06	Discuss environmental elements of simulation including logic, cognitive saturation, systems and interpretation, context of reality, shadows and lighting.		
61.07	Discuss the simulation of physical systems such as trees and forests and related events such as fires, or insect swarms such as beehives, bird flocks or anthills.		
61.08	Describe the simulation of social and economic systems including practical applications, historical precedents, modeling for community events, creation of communities including structures, states events and rendering and altering building states, population behaviors, and controlling influences.		
61.09	Describe the process of testing simulations and event models including effectiveness, diagrammatic systems evaluation, context influence, path transitions and assessing messages.		SC.912.N.1.1
62.0	Understand the use of inventory systems in game design. – The student will be able to:		
62.01	Discuss the various methods of describing items in player's inventory in contemporary game design.		
62.02	Review and discuss industry methods of communicating how inventory items can have an effect on game play.		
63.0	Use information technology tools. – The student will be able to:		
63.01	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		SC.912.N.1.1
63.02	Employ computer operations applications to access, create, manage, integrate, and store information.		
63.03	Employ collaborative/groupware applications to facilitate group work.		
64.0	Describe the roles within a game studio. – The student will be able to:		
64.01	Describe the nature and types of business organizations.		
64.02	Explain the effect of key organizational systems on performance and quality.		
64.03	List and describe quality control systems and/or practices common to the workplace.		
64.04	Explain the impact of the global economy on business organizations.		SC.912.N.4.2
65.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
65.01	Evaluate and justify decisions based on ethical reasoning.		SC.912.L.16.10
65.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
65.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.		
65.04 Interpret and explain written organizational policies and procedures.		

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation 2D Graphic Development**
Course Number: **8208130**
Course Credit: **1**

Course Description:

This course is focused on students acquiring skills to create, refine, and integrate realistic 2D graphics into a game or simulation product. Students will essentially learn how to use a graphic software package, file maintenance strategies, and migration techniques and issues.

Florida Standards			Correlation to CTE Program Standard #
66.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
66.01	Key Ideas and Details		
66.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
66.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
66.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
66.02	Craft and Structure		
66.02.1		Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
66.02.2		Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	

	66.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
66.03	Integration of Knowledge and Ideas		
	66.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	66.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	66.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
	66.03.4	Range of Reading and Level of Text Complexity	
	66.03.5 66.03.6	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
67.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
67.01	Text Types and Purposes		
	67.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	67.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	

67.02	Production and Distribution of Writing		
	67.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	67.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	67.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
67.03	Research to Build and Present Knowledge		
	67.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	67.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	67.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
67.04	Range of Writing		
	67.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
68.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
68.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
68.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
68.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		

68.04	Model with mathematics. MAFS.K12.MP.4.1	
68.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
68.06	Attend to precision. MAFS.K12.MP.6.1	
68.07	Look for and make use of structure. MAFS.K12.MP.7.1	
68.08	Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
69.0	Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 2D game graphics. – The student will be able to:		
69.01	Identify styles of art and trends such as surrealism, pop art, and expressionism by viewing reproductions, prints, videos, periodicals, books or Internet sites.		
69.02	Identify art styles from various historical periods.		
69.03	Use concise vocabulary to compare and contrast artistic elements and design principles in personal works and the works of others.		
69.04	Explore the details in works noting the use of materials, lighting and features that contribute to the overall feel and mood of the work.		
70.0	Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets. – The student will be able to:		
70.01	Understand the use of “Fair use and Fair Dealing”.		
70.02	Understand the transfer and licensing of creative works.		
70.03	Understand the use of “exclusive rights” to intellectual creations.		
70.04	Demonstrate the use of digital watermarking.		
71.0	Understand the various job titles and responsibilities of a 2D artist as it relates to the game industry. – The student will be able to:		
71.01	Identify the job titles of visual artist used in a 2D game project.		
71.02	Demonstrate the ability to work as part of an art team.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	71.03 Perform the role of the concept artist for a 2D game project.		
	71.04 Perform the role of the art director for a 2D game project.		
	71.05 Perform the role of the texture artist for a 2D game project.		
	71.06 Perform the role of the environment artist for a 2D game project.		
72.0	Develop the art direction for a 2D game. – The student will be able to:		
	72.01 Develop a vision for visual elements of a 2D game.		
	72.02 Effectively convey the mood or psychological appeal of the game to the target audience through the use of visual styles.		
	72.03 Create conceptual game art using various techniques, emphasizing space and form through range of value, placement, reflections, and shadows.		
	72.04 Create character sketches, architectural sketches and background sketches for the concept artist to render from.		
	72.05 Develop the game design documents, including schedules and technical specifications for the art team.		SC.912.N.1.1
	72.06 Understand the challenges of art direction as it relates to mobile devices.		
73.0	Determine and document the graphical and animation needs of a game using design documents including art direction and reference materials. – The student will be able to:		
	73.01 Understand the design requirements and limitations of a 2D game engine.		
	73.02 Develop characters and game elements in respect to the art direction laid out in the design documents.		
	73.03 Determine the appropriate file format vector based resolution independent vs. rasterized graphics which are resolution dependent.		
	73.04 Understand the different aspects of quality and detail in relation to performance and size.		
	73.05 Understand the role of naming conventions as it applies to creative assets storage used in the work flow.		
	73.06 Demonstrate the effective use of alternative resolutions, scaling and file formats.		
74.0	Understand the fundamentals of drawing and painting techniques. – The student will be able to:		
	74.01 Demonstrate the use (traditional or digital) of inks, watercolors, acrylics, oils, and mixed media in a 2D game.		
	74.02 Demonstrate the use of different techniques, format, media or style.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	74.03 Understand the use of primitives.		
	74.04 Demonstrate basic understanding of composition of a scene.		
	74.05 Understand the shape of the human form.		
	74.06 Know the value of lights and shadows.		
75.0	Demonstrate a working knowledge of vector and paint programs used to make 2D graphics and animation. – The student will be able to:		
	75.01 Know the difference between Vectors and Bitmaps.	MAFS.912.N-VM.1.1	
	75.02 Demonstrate understanding of various 2D art programs.		
	75.03 Utilize the programs tools and brushes.		SC.912.N.1.1
	75.04 Know the importance of Layers.		
	75.05 Identify file formats.		
76.0	2D world building, making graphics and backgrounds for 2D side scrolling, top down, and Isometric projection. – The student will be able to:		
	76.01 Know the importance of scale in relation to the player.		
	76.02 Understand 2D level design to successfully lead the player.		
	76.03 Effectively use 2D graphics to convey mood and story in the game world.		
77.0	Understand the principles of Sprite animation as it relates to 2D game graphics (walk, run, Jump, idle). – The student will be able to:		
	77.01 Demonstrate the ability to create character and object views from which to animate.		
	77.02 Break down animation into a series of pictures to import animation to a game engine.		
	77.03 Demonstrate the effective use of animation loops and cycles in a game engine.		
	77.04 Demonstrate an understanding of the value of timing to convey character motion.		
	77.05 Demonstrate the effective use of animation arcs for the articulation of body elements.		
	77.06 Demonstrate the use of principles of animation such as anticipation, squash, stretch, weight, exaggeration and overlapping & secondary motion.		SC.912.P.12.4
78.0	Facial animation, expressions, and audio lip syncing. – The student will be able to:		
	78.01 Know the basics of lip syncing.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	78.02 Understand facial land marking.		
	78.03 Demonstrate the ability to show emotions thru the eyes.		
79.0	Create graphics for the user interface such as titles and button states. – The student will be able to:		
	79.01 Understanding good menu flow of the user interface.		
	79.02 Designing the ideal HUD (Heads Up Display).		
	79.03 Wisely use text in the game interface.		
	79.04 Demonstrate the ability to creating Mock-Ups.		
80.0	Effects design and other in-game effects. – The student will be able to:		
	80.01 Understand particle design for fire and smoke.		
	80.02 Create water spray using 2D particles.		
	80.03 Know the anatomy of an explosion effect.		
	80.04 Create a 3D feel in a 2D world using light and shadows.		
81.0	Demonstrate the effective use of art input devices. – The student will be able to:		
	81.01 Demonstrate the installation, software and hardware associated with digital tablets, scanners, and a digital camera.		
	81.02 Demonstrate the use of a digital tablet within a paint software application.		
	81.03 Demonstrate the process of capturing textures using a digital camera.		
	81.04 Demonstrate the process of importing images from a digital camera into a photo editing software application.		
	81.05 Demonstrate the proper use of a scanner for image processing.		
82.0	Demonstrate leadership and teamwork skills needed, as it relates to game/simulation development, to accomplish team goals and objectives. – The student will be able to:		
	82.01 Employ leadership skills to accomplish organizational goals and objectives.		
	82.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
	82.03 Conduct and participate in meetings to accomplish work tasks.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	82.04 Employ mentoring skills to inspire and teach others.		
83.0	Explain the importance of employability skill and entrepreneurship skills as they relate to game/simulation development. – The student will be able to:		
	83.01 Identify and demonstrate positive work behaviors needed to be employable.		
	83.02 Develop personal career plan that includes goals, objectives, and strategies.		
	83.03 Examine licensing, certification, and industry credentialing requirements.		
	83.04 Maintain a career portfolio to document knowledge, skills, and experience.		
	83.05 Evaluate and compare employment opportunities that match career goals.		
	83.06 Identify and exhibit traits for retaining employment.		
	83.07 Identify opportunities and research requirements for career advancement.		SC.912.N.1.1
	83.08 Research the benefits of ongoing professional development.		SC.912.N.1.1
	83.09 Examine and describe entrepreneurship opportunities as a career planning option.		SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation 3D Graphic Animation**
Course Number: **8208140**
Course Credit: **1**

Course Description:

This course is focused on students acquiring skills to create, refine, and integrate realistic 3D graphics into a game or simulation product. Students will essentially learn how to use a 3D animation software package, file maintenance conventions, and migration techniques and issues.

Florida Standards			Correlation to CTE Program Standard #
66.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
	66.01 Key Ideas and Details		
	66.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	66.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	66.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	66.02 Craft and Structure		
	66.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	66.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	66.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
66.03	Integration of Knowledge and Ideas		
	66.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	66.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	66.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
66.04	Range of Reading and Level of Text Complexity		
	66.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	66.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
67.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Visual Design.		
67.01	Text Types and Purposes		
	67.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	67.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
67.02	Production and Distribution of Writing		
	67.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	67.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	67.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	67.03	Research to Build and Present Knowledge	
	67.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	67.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	67.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	67.04	Range of Writing	
	67.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
68.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Visual Design.	
	68.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	68.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	68.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	68.04	Model with mathematics. MAFS.K12.MP.4.1	
	68.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	61.01	Attend to precision. MAFS.K12.MP.6.1	
	61.02	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
61.03 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
84.0 Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 3D game graphics. – The student will be able to:		
84.01 Identify styles of art and trends such as surrealism, pop art, and expressionism by viewing reproductions, prints, videos, periodicals, books or Internet sites.		
84.02 Identify art styles from various historical periods.		
84.03 Use concise vocabulary to compare and contrast artistic elements and design principles in personal works and the works of others.		
84.04 Explore the details in works noting the use of materials, lighting and features that contribute to the overall feel and mood of the work.		
85.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets. – The student will be able to:		
85.01 Understand the use of “Fair use and Fair Dealing”.		
85.02 Understand the transfer and licensing of creative works.		
85.03 Understand the use of “exclusive rights” to intellectual creations.		
85.04 Demonstrate the use of digital watermarking.		
86.0 Understand the various job titles and responsibilities of a 3D artist as it relates to the game industry. – The student will be able to:		
86.01 Identify the job titles of visual artist used in a 3D game project.		
86.02 Demonstrate the ability to work as part of an art team.		
86.03 Perform the role of the concept artist for a 3D game project.		
86.04 Perform the role of the art director for a 3D game project.		
86.05 Perform the role of the texture artist for a 3D game project.		
86.06 Perform the role of the environment artist for a 3D game project.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
87.0	Develop the art direction for a 3D game. – The student will be able to:		
87.01	Develop a vision for visual elements of a 3D game.		
87.02	Effectively convey the mood or psychological appeal of the game to the target audience through the use of visual styles.		
87.03	Create conceptual game art using various techniques, emphasizing space and form through range of value, placement, reflections, and shadows.	MAFS.912.G-MG.1.1 MAFS.912.G-CO.1.5	
87.04	Create character sketches, architectural sketches and background sketches for the concept artist to render from.		
87.05	Develop the game design documents, including schedules and technical specifications for the art team.		
87.06	Understand the challenges of art direction as it relates to mobile devices.		
88.0	Determine and document the graphical and animation needs of a game using design documents including art direction and reference materials. – The student will be able to:		
88.01	Understand the design requirements and limitations of a 3D game engine.		
88.02	Develop characters and game elements in respect to the art direction laid out in the design documents.		
88.03	Determine the appropriate file format as it applies to pixel based graphics, which are resolution dependent.		
88.04	Understand the different aspects of quality and detail in relation to performance and size.		
88.05	Understand the role of naming conventions as it applies to creative assets storage used in the work flow.		
88.06	Demonstrate the effective use of alternative resolutions, scaling and file formats.		
89.0	Understand the fundamentals of drawing and painting techniques. – The student will be able to:		
89.01	Demonstrate the use (traditional or digital) of inks, watercolors, acrylics, oils, and mixed media in a 3D game.		
89.02	Demonstrate the use of different techniques, format, media or style.		
89.03	Understand the use of primitives.		
89.04	Demonstrate basic understanding of composition of a scene.		
89.05	Understand the shape of the human form.		
89.06	Know the value of lights and shadows.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
90.0	Demonstrate a working knowledge of modeling and paint programs used to make 3D graphics and animation. – The student will be able to:		
90.01	Understand the limitation of bitmaps images.		
90.02	Understand the use and application of bump map, normal and displacement images applied to a model.		
90.03	Demonstrate understanding of various digital content creation tools.		
90.04	Utilize the programs tools and brushes.		
90.05	Know the importance of layers.		SC.912.N.1.1
90.06	Identify file formats.		
91.0	3D world building, making graphics and backgrounds for 3D side scrolling, top down, and Isometric projection. – The student will be able to:		
91.01	Know the importance of scale in relation to the player.		
91.02	Understand 3D level design to successfully lead the player.		
91.03	Effectively use 3D graphics to convey mood and story in the game world.		
92.0	Understand the principles of Sprite animation as it relates to 3D game graphics (walk, run, Jump, idle). – The student will be able to:		
92.01	Demonstrate the ability to create character and object views from which to animate.		
92.02	Break down animation into a series of pictures.		
92.03	Demonstrate the effective use of animation loops and cycles in a game engine.		
92.04	Demonstrate an understanding of the value of timing to convey character motion.		
92.05	Demonstrate the effective use of animation arcs for the articulation of body elements.		
92.06	Demonstrate the use of principles of animation such as anticipation, squash, stretch, weight, exaggeration and overlapping & secondary motion.		
92.07	Understand the use of motion capture techniques and acting principles.		SC.912.P.12.4
93.0	Facial animation, expressions, and audio lip syncing. – The student will be able to:		
93.01	Know the basics of lip syncing.		
93.02	Understand facial land marking.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	93.03 Demonstrate the ability to show emotions thru the eyes.		
	93.04 Demonstrate the use of motion capture data as it applies to facial animation.		
94.0	Create graphics for the user interface including titles and button states. – The student will be able to:		
	94.01 Understanding good menu flow of the user interface.		
	94.02 Designing the ideal HUD (Heads Up Display).		
	94.03 Wisely using text in the game interface.		
	94.04 Demonstrate the ability for creating Mock-Ups.		
95.0	Particle system design and other in-game effects such as lighting and shadows. – The student will be able to:		
	95.01 Understand particle design for fire and smoke.		
	95.02 Create water spray using 3D particles.		
	95.03 Know the aspects of an explosion effect.		
	95.04 Create a photorealistic or artistic style in a 3D world using light, shadows, bump maps, and textures.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Game/Simulation/Animation Audio/Video Effects**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8208200
CIP Number	0550041115
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @ 7 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other 27-1014 – Multimedia Artists and Animators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Game/Simulation Designer, Digital Media Artist, and Digital Media Specialist in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to practical experiences in game/simulation conceptualization, design, storyboarding, development methodologies, audio/sound effects design and production, video/special effects design and production, and implementation issues. Specialized skills involving audio and video editing equipment and software are used to produce a variety of intrinsic and special audio/video effects.

This program is project-based and focuses on broad, transferable skills and stresses understanding and demonstration of the following rudiments of

the game and simulation industry: production planning, elements of production design, storyboarding, elements of visual design, integration of digital audio and digital video into new game/simulation productions, and collaboration/teamwork.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. Students enrolling in this program must be computer literate. This literacy can be achieved by completing one credit of the Digital Information Technology. It is also recommended that students complete core courses in digital arts, computer arts, or digital media. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or exit as an occupational completer.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8207310	Digital Information Technology **OR**	1 credit	15-1199	2	PA
	8208110	Game & Simulation Foundations	1 credit		2	VO
	8208120	Game & Simulation Design	1 credit		2	VO
B	8208230	Game & Simulation Audio/Sound Effects	1 credit	27-1014	2	VO
C	8208240	Game & Simulation Video/Special Effects	1 credit	27-1014	2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
8208110	1/87 1%	14/80 18%	23/83 28%	9/69 13%	28/67 42%	6/70 9%	2/69 3%	28/82 34%	9/66 14%	34/74 46%	16/72 22%
8208120	6/87 7%	18/80 23%	27/83 33%	13/69 19%	31/67 46%	13/70 19%	6/69 9%	31/82 38%	12/66 18%	41/74 55%	20/72 28%
8208230	19/87 22%	19/80 24%	#	19/69 28%	#	19/70 27%	19/69 28%	#	14/66 21%	#	19/72 26%

8208240	20/87 23%	20/80 25%	1/83 1%	22/69 32%	1/67 1%	1/70 1%	22/69 32%	1/82 1%	17/66 26%	1/74 1%	1/72 1%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
8208110	14/67 21%	9/75 12%	13/54 24%	#	#	#	#
8208120	16/67 24%	11/75 15%	17/54 31%	7/46 15%	7/45 16%	7/45 16%	7/45 16%
8208230	8/67 12%	14/75 19%	8/54 15%	#	#	#	#
8208240	8/67 12%	18/75 24%	8/54 15%	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Program Recommendations

The Game/Simulation/Animation Audio/Video Effects program lends itself to integration of the core academic subjects of language arts, math, science, visual arts, and social studies into project activities. It is through a balanced and integrated curriculum that students attain the attitudes, skills, and knowledge needed to compete successfully in today's work force. To achieve total curriculum integration, academic and career and technical education teachers should be scheduled with common planning times.

This program emphasizes the development of technical abilities as well as ethical and societal awareness necessary to function in a highly technological society. The use of cooperative learning groups is recommended. By learning and practicing group process skills, students will be prepared to work "together" in real work situations. Program graduates will develop enhanced self-esteem as well as the problem solving and teamwork skills necessary to succeed in careers and postsecondary education.

The Game/Simulation/Animation Audio/Video Effects program places a strong emphasis on workplace learning. Job shadowing and mentoring experiences with game and simulation professionals along with on-site trips to local businesses connect classroom learning to the workplace. In-class guest speakers bring the real world into the classroom.

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices

describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game.
19.0 Use information technology tools.
20.0 Design and create a playable game.
21.0 Categorize the different gaming genres.
22.0 Categorize different gaming platforms.
23.0 Understand the historical significance of electronic and non-electronic games.
24.0 Describe the trends in current and future game development.
25.0 Identify the business model commonly used in game development industries.
26.0 Examine and categorize the significant processes in the production of games.
27.0 Understand the core tasks and challenges that face a video game design team.
28.0 Identify legal issues that affect games, developers and players.
29.0 Demonstrate the professional level of written and oral communication required in the game development industry.

30.0 Investigate career opportunities in the game industry.
31.0 Demonstrate an understanding of the vocabulary of the industry for discussing games and play.
32.0 Demonstrate research and information fluency.
33.0 Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design.
34.0 Identify popular games and identify commonality between them.
35.0 Understand the general procedure and requirements of game design.
36.0 Explore the methods used to create and sustain player immersion.
37.0 Become familiar with popular game tools such as DirectX, 3DMax, and different gaming engines.
38.0 Demonstrate language arts knowledge and skills.
39.0 Demonstrate mathematics knowledge and skills.
40.0 Demonstrate science knowledge and skills.
41.0 Create a working game or simulation individually or as part of a team.
42.0 Describe the game development life cycle.
43.0 Identify hardware constraints on video games including processors and I/O devices.
44.0 Understand the general principles of storytelling.
45.0 Understand character archetypes and character design.
46.0 Understand the use of storyboarding in game design.
47.0 Develop a game design document or cut.
48.0 Understand outlining in game designs.
49.0 Explore elements of puzzle design.
50.0 Discuss game designer strategy considerations.
51.0 Understand the process of creating and designing player choice.
52.0 Create and design the game flow as it relates to story and plot.
53.0 Assess common principles and procedures in game flow design.
54.0 Describe rule creation elements of player challenge.
55.0 Identify tools and software commonly used in game development.
56.0 Understand the technical methodologies for integrating digital media into a game or simulation.
57.0 Identify commonly used art and animation production tools in the game design industry.
58.0 Understand the general concepts of environmental design.
59.0 Describe how environmental design is used in conjunction with game level design.
60.0 Describe pertinent issues facing game designers.
61.0 Describe Monte Carlo simulation as it relates to game design.
62.0 Understand the use of inventory systems in game design.
63.0 Use information technology tools.
64.0 Describe the roles within a game studio.
65.0 Describe the importance of professional ethics and legal responsibilities.
66.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.
67.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.
68.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.

69.0 Understand the history of audio/sound effects in the entertainment industry.
70.0 Perform various job roles typical for an audio technician on a game/simulation project.
71.0 Understand intellectual property rights, copyright laws, and plagiarism as they apply to creative assets.
72.0 Demonstrate a knowledge of production writing as it relates to game and simulation design.
73.0 Demonstrate appropriate voice acting skills.
74.0 Demonstrate basic audio production.
75.0 Set-up and configure a computer for audio applications.
76.0 Operate an audio workstation.
77.0 Demonstrate application of MIDI in a game/simulation project.
78.0 Incorporate audio assets into game/simulation engine.
79.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
80.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
81.0 Explain the importance of employability skill and entrepreneurship skills.
82.0 Demonstrate personal money-management concepts, procedures, and strategies.
83.0 Understand the history of video effects in the entertainment.
84.0 Understand the various job titles and responsibilities video technician as it relates to game and simulation design.
85.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets.
86.0 Demonstrate a knowledge of production writing as it relates to game and simulation design.
87.0 Demonstrate appropriate acting skills.
88.0 Demonstrate basic video production.
89.0 Demonstrate set-up and configuration of a computer for video applications.
90.0 Demonstrate the basic operation of a video workstation.
91.0 Incorporate video assets into game/simulation engine.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

OR

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Foundations**
Course Number: **8208110**
Course Credit: **1**

Course Description:

This course is designed to provide an introduction to game and simulation concepts and careers, the impact game and simulation has on society and industry, and basic game/simulation design concepts such as rule design, play mechanics, and media integration. This course compares and contrasts games and simulations, key development methodologies and tools, careers, and industry-related information. This course also covers strategies, processes, and methods for conceptualizing a game or simulation application; storyboarding techniques; and development tools.

Hands-on activities using an entry-level game development tool should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation of a playable game.**

Game & Simulation Creation

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

Florida Standards			Correlation to CTE Program Standard #
Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.			
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific	

Florida Standards			Correlation to CTE Program Standard #
		words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards			Correlation to CTE Program Standard #
	02.02	Production and Distribution of Writing	
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game. – The student will be able to:		
18.01 Use industry standard game design production documents to create a game design production plan.		SC.912.N.1.1
19.0 Use information technology tools. – The student will be able to:		SC.912.P.10.1; 10.2; 10.5; 10.16; 12.2
19.01 Use personal information management (PIM) applications to increase workplace efficiency.		
19.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
20.0 Design and create a playable game. – The student will be able to:		
20.01 Use a number of computer tools to enhance and ease game programming and artistry.		
20.02 Use a game engine to create a playable game.		SC.912.N.1.1
20.03 Use animated objects.		SC.912.N.1.1
20.04 Integrate sound and music to enhance the game experience.		SC.912.N.3.5
20.05 Test and debug to game completion.		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
21.0	Categorize the different gaming genres. – The student will be able to:		
21.01	Research, compare and categorize the different gaming genres.		SC.912.L.15.4
21.02	Analyze examples of different gaming genres.		SC.912.L.15.6
21.03	Define and use the necessary vocabulary related to gaming and the different genres.		
22.0	Categorize different gaming platforms. – The student will be able to:		
22.01	Research, compare and categorize different gaming platforms.		SC.912.N.1.1
22.02	Analyze the distinctive features of each system.		SC.912.L.15.6
22.03	Define the target audience for different platforms based on features, available games, and price of system and games.		
22.04	Define and use the necessary vocabulary related to gaming platforms.		
23.0	Understand the historical significance of electronic and non-electronic games. – The student will be able to:		SC.912.P.10.18; 10.20
23.01	Discuss the history of non-electronic games.		SC.912.N.3.2
23.02	Describe the history and theory of mainstream and experimental media including radio, movies, television, art, and theatre.		SC.912.N.2.4
23.03	Explain the historical timeline of electronic games, marking the significant highlights in their evolution.		
24.0	Describe the trends in current and future game development. – The student will be able to:		SC.912.N.1.7; .3.5; SC.912.P.10.2; 10.10; 12.2; 12.3; 12.5; 12.6
24.01	Determine and analyze the significant trends in game development in the past two decades.		SC.912.N.1.1
24.02	Research and brainstorm the possibilities for the future of electronic games based on current and emerging technologies and future predictions.		SC.912.N.1.1
25.0	Identify the business model commonly used in game development industries. – The student will be able to:		
25.01	Identify, define and discuss the different ways games are funded, marketed and sold.		
25.02	Identify and describe licensing management for different gaming platforms.		
25.03	Discuss the product value and business differences between major game platforms.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
25.04	Identify successful business models and analyze various facets of those models, such as market analysis, marketing strategy, and product value.		
25.05	Discuss the opportunities available to independent game developers and entrepreneurs in the mobile application market.		
26.0	Examine and categorize the significant processes in the production of games. – The student will be able to:		SC.912.N.1.1; 1.5
26.01	Discuss the relationships between publishers, developers, distributors, marketers, and retailers.		
26.02	Identify processes of development including content creation, team roles, design documentation, and process management.		
26.03	Explore and describe the effects of globalization on the design and production of video games.		
27.0	Understand the core tasks and challenges that face a video game design team. – The student will be able to:		SC.912.N.1.1
27.01	Identify and define the roles and responsibilities of team members on a video game design team.		SC.912.L.14.2
27.02	Describe the effects of group dynamics and the importance of team building for a design team.		
27.03	Explore and discuss methods of communications and scheduling for design teams.		
27.04	Describe the importance and interrelationship between development schedule and budget constraints in video game design.		
28.0	Identify legal issues that affect games, developers and players. – The student will be able to:		
28.01	Define and discuss intellectual property and contract law as it relates to the gaming industry.		
28.02	Describe legal and liability issues that could affect online communities.		SC.912.N.1.3
28.03	Compare and contrast government and industry content regulation and industry ratings of video games.		
29.0	Demonstrate the professional level of written and oral communication required in the game development industry. – The student will be able to:		SC.912.N.1.1
29.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.		SC.912.N.1.1
29.02	Organize ideas and communicate oral and written messages appropriate for the game development industry environment.		SC.912.N.1.1
29.03	Identify, define, and discuss terminology appropriate for both internal and external communications in the game development industry environment.		
29.04	Compose electronic documents used to facilitate formal and informal communication in the game industry such as letters, reports, memos, emails, presentations, budgets,		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	charts and calendars.		
30.0	Investigate career opportunities in the game industry. – The student will be able to:		SC.912.N.4.2
30.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.		
30.02	Analyze job and career requirements and relate career interests to opportunities in the global economy.		
30.03	Describe job requirements for a variety of occupations within the game development industry.		
30.04	Identify current employment trends and career opportunities in the game industry.		
30.05	Evaluate personal aptitude and skills to match specific employment opportunities.		
30.06	Develop an educational plan to acquire the skills and requirements of a selected employment opportunity within the game industry.		
31.0	Demonstrate an understanding of the vocabulary of the industry for discussing games and play. – The student will be able to:		
31.01	Identify, define, and discuss professional game design and analysis terminology appropriate for internal and external communications in a game design environment.		
31.02	Identify and define the vocabulary used by game players and online gaming communities.		
32.0	Demonstrate research and information fluency. - The student will be able to:		
32.01	Locate, analyze, process, and organize data from multiple sources including the Internet.		
32.02	Play games to research and collect game play data.		
32.03	Evaluate, analyze and document game styles and playability.		
32.04	Determine the dramatic elements in games, including kinds of fun, player types and nonlinear storytelling.		
33.0	Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow and game design. – The student will be able to:		
33.01	Test and analyze games to determine the quality of rules, interfaces, navigation, performance, play, artistry and longevity in design and structure.		SC.912.N.1.1
33.02	Research and evaluate the game analysis techniques used by the video game industry.		SC.912.N.1.1
33.03	Identify the key elements in a game and make intelligent judgments about whether the game succeeded or failed in its objectives.		SC.912.N.1.1
33.04	Evaluate professional reviews and write a critical analysis of a current video game.		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
34.0	Identify popular games and identify commonality between them. – The student will be able to:		
34.01	Analyze and deconstruct game environments and interactions.		SC.912.N.1.1
34.02	Compare and contrast the top selling video games in terms of player interaction, plot complexity, and reward.		
34.03	Categorize gameplay elements by player type. (killer, talker, explorer and achiever)		
35.0	Understand the general procedure and requirements of game design. – The student will be able to:		SC.912.N.1.7
35.01	Describe the design process from conception to production.		SC.912.N.1.1
35.02	Explain the iterative nature of game design through the different stages of design iterations including pre-alpha, alpha, beta, release candidate, going gold and support.		
35.03	Develop design plans, for example, character sketches, documentation and storyboards for proposed games.		
36.0	Explore the methods used to create and sustain player immersion. – The student will be able to:		
36.01	Research and define the term “player immersion”.		
36.02	Explore and explain the factors that create player immersion in a game.		
36.03	Examine popular games and explain the methods each game uses to increase player immersion.		
37.0	Become familiar with popular game technology such as DirectX, 3DMAX, and different gaming engines. – The student will be able to:		
37.01	Identify and discuss the popular game development tools currently used in the industry.		
37.02	Identify and discuss popular gaming engines.		
37.03	Research and analyze the uses for different game development tools.		SC.912.N.1.1
38.0	Demonstrate language arts knowledge and skills. – The student will be able to:		
38.01	Locate, comprehend and evaluate key elements of oral and written information.		SC.912.N.1.1
38.02	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
38.03	Present information formally and informally for specific purposes and audiences.		SC.912.N.1.1
39.0	Demonstrate mathematics knowledge and skills. – The student will be able to:		
39.01	Demonstrate knowledge of arithmetic operations.		SC.912.P.10.3

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	39.02 Analyze and apply data and measurements to solve problems and interpret documents.		SC.912.N.1.1
	39.03 Construct charts/tables/graphs using functions and data.	MAFS.912.F-IF.3.7	SC.912.N.1.1
40.0	Demonstrate science knowledge and skills. – The student will be able to:		
	40.01 Discuss the role of creativity in constructing scientific questions, methods and explanations.		SC.912.N.1.7
	40.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.		SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Design**
Course Number: **8208120**
Course Credit: **1**

Course Description:

This course covers fundamental principles of designing a game or a simulation application, rules and strategies of play, conditional branching, design and development constraints, use of sound and animation, design tools, and implementation issues. The content includes market research, product design documentation, storyboarding, proposal development, and presentation of a project report. Emphasis is placed on the techniques needed to develop well-documented, structured game or simulation programs. Extensive use is made of evaluating and analyzing existing games or simulations.

Hands-on activities using an entry-level game development tool should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation and presentation of a playable game with design documentation.**

Game/Simulation Project

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific	

Florida Standards			Correlation to CTE Program Standard #
		words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards			Correlation to CTE Program Standard #
	02.02	Production and Distribution of Writing	
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
41.0 Create a working game or simulation individually or as part of a team. – The student will be able to:		SC.912.N.1.1
41.01 Create a storyboard describing the essential elements, plot, flow, and functions of the game/simulation.	MAFS.912.G-MG.1.3	
41.02 Create a design specification document to include interface and delivery choices, rules of play, navigation functionality, scoring, media choices, start and end of play, special features, and development team credits.		
41.03 Using a simple game development tool, create a game or simulation.		SC.912.N.3.5
41.04 Present the game or simulation.		SC.912.N.3.5
42.0 Describe the game development life cycle. – The student will be able to:		SC.912.P.10.13; 10.14; 10.15; 10.18
42.01 Identify steps in the pre-production process including the proof of concept and market research.		
42.02 Describe the iterative prototyping process – Alpha, Beta, RTM.		
42.03 Determine platform, technology and scripting requirements.		
42.04 Implement techniques of scenario development, levels, and missions.		
42.05 Discuss game testing requirements and methods.		SC.912.N.1.1
42.06 Identify and describe maintenance, upgrade and sequel issues.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
43.0	Identify hardware constraints on video games including processors and I/O devices. – The student will be able to:		
43.01	Identify the different control systems for video games.		
43.02	Compare and contrast personal computer and video game console hardware, including display systems.	MAFS.912.S-CP.1.1	
43.03	Explain the factors that can limit the game-playing ability of personal computers.		SC.912.L.17.5
44.0	Understand the general principles of storytelling. – The student will be able to:		
44.01	Identify the essential elements of a story.		
44.02	Describe how creative writing is used as a game design tool.		
44.03	Compare and contrast methods of delivering a story in a game.		
45.0	Understand character archetypes and character design. – The student will be able to:		
45.01	Research and identify common character archetypes used in computer games.		
45.02	Design character prototypes to physically match archetype.		
45.03	Apply symbolize and semiotic design elements within character design to convey meaning.		
45.04	Create character backstory and profile.		
46.0	Understand the use of storyboarding in game design. – The student will be able to:		
46.01	Assess the techniques used in the gaming industry for rendering basic Game Design Art.		
46.02	Describe how game layout charts are used in game design.		
46.03	Describe how storyboards in the game design process can be used as a pre-development sales tool.		
46.04	Analyze and compare the use of storyboards in the game design industry with regard to environmental illustrations, level designs, character designs, model sheets and GUI Designs.		
47.0	Develop a game design document or cut. – The student will be able to:		
47.01	Evaluate and discuss the choice of delivery system.		
47.02	Evaluate and discuss choices of genre, game design software, art, digital media, and animation software.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
47.03	Create a game strategy overview, character overview, and storyboard overview.		
47.04	Define the rules of play and multi-player options.		
47.05	Create the layout and interfaces overview and digital media overview.	MAFS.912.G-MG.1.3	
47.06	Determine the gameplay interaction requirements and create the progression levels overview.		
47.07	Define strategic positioning of game immersion dynamics and psychological effect.		SC.912.N.1.1
47.08	Identify hardware and software constraints.		SC.912.L.17.5
48.0	Understand outlining in game designs. – The student will be able to:		
48.01	Assess techniques of goal design in gaming.		
48.02	Describe the concept of nested victories.		
48.03	Discuss the use of players as agents of change.		
48.04	Compare and contrast examples of understandable context in gaming.		
48.05	Discuss the principles underlying the creation of understandable rules.		
48.06	Describe how skill building is used in game design.		
48.07	Describe conventional techniques of positive feedback.		
48.08	Discuss functional consistency as it relates to the use of interfaces.		
49.0	Explore elements of puzzle design. – The student will be able to:		SC.912.P.10.14; 10.15
49.01	Describe the essential elements of a puzzle.		
49.02	Identify the different types of puzzles.		
49.03	Describe the basic principles of high-level puzzle design.		
49.04	Describe the basic principles of low-level puzzle design.		
50.0	Discuss game designer strategy considerations. – The student will be able to:		SC.912.L.17.15
50.01	Describe the use of artificial intelligence challenges in game design and the need for giving the player rest time between challenges.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
50.02	Evaluate the impact of randomness in game design especially as it pertains to pattern recognition.	MAFS.912.S-MD.1.1 MAFS.912.S-MD.1.2	
50.03	Identify techniques used in the industry to help the player to navigate.		
50.04	Explain the use of “just barely” victories and failures as an exciting and immersive technique.		
50.05	Assess techniques used to provide a range of challenges and appeal to a wide range of abilities.		
50.06	Describe the psychological cost of failure in games as it pertains to immersion and psychological effect.		
50.07	Identify methods of preparing the player for greater challenge while allowing for plot development as the story serves the game.		
51.0	Understand the process of creating and designing player choice. – The student will be able to:		
51.01	Discuss the principles of player-centric design.		
51.02	Research and correlate game complexity level to appropriate age group such that content matches user skill set required.		SC.912.N.1.1
51.03	Examine and discuss design elements that encourage continuous active engagement both mental and physical.		
51.04	Analyze design elements that maintain player interest and vary the degree of challenge.		SC.912.N.1.1
51.05	Discuss the need for a balance of design elements for the purpose of rewarding and frustrating players.		
52.0	Create and design the game flow as it relates to story and plot. – The student will be able to:		
52.01	Identify techniques of introducing the story plot and beginning play.		
52.02	Describe story plot development techniques for the middle of play in game design.		
52.03	Analyze and discuss planning techniques for climax and finale of games.		
53.0	Assess common principles and procedures in game flow design. – The student will be able to:		
53.01	Assess missions and scenarios game flow techniques.		
53.02	Describe common use of mission design and campaigns.		
53.03	Evaluate usage of static versus dynamic campaigns.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
54.0	Describe player challenge rule creation elements. – The student will be able to:		
54.01	Research common design methods for clearing obstacles or series of obstacles.		SC.912.N.1.1
54.02	Describe common design elements introducing skill, luck and combinations including escalating challenges to games.		
54.03	Identify common design elements used to vary weapons, characters and tools.		
54.04	Discuss the incorporation of risk reward and adaptive challenges (AI).		
54.05	Evaluate industry use of boss encounters in games.		
54.06	Analyze and discuss design considerations from the perspective of other players and multi-player environments.		
55.0	Identify tools and software commonly used in game development. – The student will be able to:		
55.01	Identify and discuss the popular game development tools currently used in the industry.		
55.02	Identify and discuss popular gaming engines.		
55.03	Identify and discuss popular world building tools.		
56.0	Understand the technical methodologies for integrating digital media into a game or simulation. – The student will be able to:		
56.01	Survey and discuss the use of naming conventions and temp sounds.		
56.02	Analyze and discuss methods of matching sound effects to art assets.		
56.03	Identify and categorize commonly used technology sound engine integration equipment.		
56.04	Identify and discuss resources such as sound effects libraries.		SC.912.P.10.21
56.05	Examine methods of sound implementation and associated software.		
56.06	Describe how and why digital video may be integrated into a game or simulation design.		
56.07	Describe how special effects differ from animation.		
57.0	Identify commonly used art and animation production tools in the game design industry. – The student will be able to:		
57.01	Identify, categorize and discuss art and animation tools commonly used in game design.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
58.0	Understand the general concepts of environmental design. – The student will be able to:		
58.01	Survey and evaluate commonly used concept art.		
58.02	Create a world sketch with particular attention to maintaining continuity of style.		
58.03	Describe the emotional/psychological aspects of environmental design that signify mood, façade of freedom, and resource struggling.		
59.0	Describe how environmental design is used in conjunction with game level design. – The student will be able to:		
59.01	Examine and evaluate examples of focus on a theme.		
59.02	Describe methods of creating a purposeful architecture giving consideration to continuity and themes and taking advantage of revisiting.		
59.03	Consider and discuss environmental design elements for multi-player or single player games.		
59.04	Describe the history of creating shifts in game design environments and embracing novel ideas.		
59.05	Identify and discuss environmental design pitfalls such as red herrings and cookie-cutter layouts.		
60.0	Describe pertinent issues facing game designers. – The student will be able to:		
60.01	Discuss the meaning of simulation and give examples of simulation and complexity including architecture, exposure, concealment and heuristics.		
60.02	Describe applied event modeling including goal discovery, map making, event exploration, developing incentives and learning in event modeling for games.		
60.03	Explain the concepts of modes of understanding, inductive and iconic logic, significance and saturation in event modeling for game design.		
61.0	Describe Monte Carlo simulation as it relates to game design. – The student will be able to:		SC.912.P.8.7; 10.1; 10.2; 10.4; 10.5; 10.10; 12.3; 12.4; 12.5; 12.6; SC.912.L.14.16; 17.5; 17.15; SC.912.N.1.7
61.01	Discuss the process of specifying events including contexts of simulation, translating event models to simulations, formalizing thematic objectives, prototyping, interface design and use cases with modeling.		
61.02	Discuss the process of designing entities including behavior and entity graphics.		
61.03	Describe the implementation of entities including enumerating animations, playing with time, creating events, adding an entity class, and creating entity events and behaviors.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
61.04	Analyze event modeling in creating a world including the creation of a world class, adding and removing entities, accessing entities, updating and rendering, adding scene hierarchies and handling world events.		
61.05	Assess and discuss AI and physics issues for simulation including AI event contexts, adding intelligence and gravity, adding collision detection, updating for collisions and applying mass and force.		SC.912.P.12.5, SC.912.P.10.6, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.12.4
61.06	Discuss environmental elements of simulation including logic, cognitive saturation, systems and interpretation, context of reality, shadows and lighting.		
61.07	Discuss the simulation of physical systems such as trees and forests and related events such as fires, or insect swarms such as beehives, bird flocks or anthills.		
61.08	Describe the simulation of social and economic systems including practical applications, historical precedents, modeling for community events, creation of communities including structures, states events and rendering and altering building states, population behaviors, and controlling influences.		
61.09	Describe the process of testing simulations and event models including effectiveness, diagrammatic systems evaluation, context influence, path transitions and assessing messages.		SC.912.N.1.1
62.0	Understand the use of inventory systems in game design. – The student will be able to:		
62.01	Discuss the various methods of describing items in player's inventory in contemporary game design.		
62.02	Review and discuss industry methods of communicating how inventory items can have an effect on game play.		
63.0	Use information technology tools. – The student will be able to:		
63.01	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		SC.912.N.1.1
63.02	Employ computer operations applications to access, create, manage, integrate, and store information.		
63.03	Employ collaborative/groupware applications to facilitate group work.		
64.0	Describe the roles within a game studio. – The student will be able to:		
64.01	Describe the nature and types of business organizations.		
64.02	Explain the effect of key organizational systems on performance and quality.		
64.03	List and describe quality control systems and/or practices common to the workplace.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	64.04 Explain the impact of the global economy on business organizations.		SC.912.N.4.2
65.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
	65.01 Evaluate and justify decisions based on ethical reasoning.		SC.912.L.16.10
	65.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		
	65.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.		
	65.04 Interpret and explain written organizational policies and procedures.		

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Audio/Sound Effects**
Course Number: **8208230**
Course Credit: **1**

Course Description:

This course is focused on students acquiring skills in designing, producing, editing, and integrating audio and sound effects into a game or simulation application.

Florida Standards			Correlation to CTE Program Standard #
66.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
66.01	Key Ideas and Details		
66.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
66.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
66.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
66.02	Craft and Structure		
66.02.1		Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
66.02.2		Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
66.02.3		Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
66.03	Integration of Knowledge and Ideas		
	66.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	66.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	66.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
66.04	Range of Reading and Level of Text Complexity		
	66.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	66.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
67.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
67.01	Text Types and Purposes		
	67.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	67.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
67.02	Production and Distribution of Writing		
	67.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	67.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	67.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	67.03	Research to Build and Present Knowledge	
	67.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	67.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	67.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	67.04	Range of Writing	
	67.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
68.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.	
	68.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	68.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	68.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	68.04	Model with mathematics. MAFS.K12.MP.4.1	
	68.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	68.06	Attend to precision. MAFS.K12.MP.6.1	
	68.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
68.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
69.0	Understand the history of audio/sound effects in the entertainment industry. – The student will be able to:		
69.01	Discuss the role of sound in a visual presentation.		
69.02	Describe how audio/sound effects can establish or reinforce the mood.		
69.03	Explain the importance of production value.		
69.04	Describe the evolution of audio/sound effects production.		
69.05	Identify the technology incorporated into the production of sound.		
70.0	Perform various job roles typical for an audio technician on a game/simulation project. – The student will be able to:		
70.01	Identify the job titles of audio technicians and artists typically involved in a game project.		
70.02	Work as part of a sound design team.		
70.03	Perform the role of the sound designer for a game/simulation project.		
70.04	Perform the role of music supervisor for a game/simulation project.		
70.05	Perform the role of Foley artist for a game/simulation project.		
70.06	Perform the role of voice actor for a game/simulation project.		
70.07	Perform the role of recording engineer for a game/simulation project.		
70.08	Perform the role of sound editor for a game/simulation project.		
70.09	Perform the role of composer/arranger for a game/simulation project.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
71.0	Understand intellectual property rights, copyright laws, and plagiarism as they apply to creative assets. – The student will be able to:		
71.01	Compare and contrast the doctrines of fair use and fair dealing.		
71.02	Describe the transfer and licensing of creative works.		
71.03	Explain the use of “exclusive rights” to intellectual creations.		
71.04	Use digital watermarking to embed copyright information in an audio file.		
72.0	Demonstrate a knowledge of production writing as it relates to game and simulation design. – The student will be able to:		
72.01	Explain the job of a scriptwriter and outline the elements of a script.		
72.02	Breakdown a script into audio production elements.		
72.03	Write simple dialog.		
72.04	Translate script elements into lyrics for a theme song.		
72.05	Write narration or instructions for game/simulation.		
73.0	Demonstrate appropriate voice acting skills. – The student will be able to:		
73.01	Read aloud in a professional manner.		
73.02	Receive and properly act upon direction given by the producer/director.		
73.03	Understand the concept of voice acting and playing a role while speaking.		
73.04	Perform various voice acting assignments in a professional manner according to industry standards.		
74.0	Demonstrate basic audio production. – The student will be able to:		
74.01	Describe digital audio storage concepts and digital storage media.		
74.02	Operate digital recording decks and other digital storage devices.		
74.03	Describe the function and operation of digital audio workstations.		
74.04	Edit, cut, erase, and insert sound utilizing various digital production techniques.		
74.05	Perform digital noise reduction and noise extraction via spectral display.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
75.0 Set-up and configure a computer for audio applications. – The student will be able to:		
75.01 Install basic peripheral devices related to audio programs.		
75.02 Install and configure software related to audio programs.		
75.03 Demonstrate basic knowledge of computer system requirements.		
75.04 Install plug-ins or additional audio source material such as beats and or samples.		
75.05 Diagram the signal flow of a digital audio workstation.		
76.0 Operate an audio workstation. – The student will be able to:		
76.01 Demonstrate knowledge of the digital audio workstation interface.		
76.02 Create and arrange a multi-track project.		
76.03 Create interest and effect using editing techniques		
76.04 Design and edit audio using a waveform editor.		
76.05 Record audio directly to the digital audio workstation.		
76.06 Mix audio.		
76.07 Demonstrate skill in using audio effects and plug-ins.		
76.08 Prepare an audio project for finishing and final mix down.		
76.09 Transfer audio files between various audio software applications.		
76.10 Demonstrate the understanding of audio file bit depth, bandwidth and dithering and be able to explain when and where these apply in various applications of digital audio production.		
76.11 Export finished audio.		
77.0 Demonstrate application of MIDI in a game/simulation project. – The student will be able to:		
77.01 Demonstrate an understanding of MIDI.		
77.02 Discuss the advantage and use of MIDI in a game/simulation.		
77.03 Discuss the limitations of MIDI.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
77.04	Utilize a computer and multiple MIDI instruments.		
77.05	Record a single sound track; add multiple sound tracks, and change MIDI voices using the software.		
77.06	Export a MIDI soundtrack for use in a game/simulation.		
77.07	Export a MIDI sound effect for use in a game/simulation.		
77.08	Apply MIDI file to an object or game/simulation element.		
78.0	Incorporate audio assets into game/simulation engine. – The student will be able to:		
78.01	Describe the audio effects workflow.		
78.02	Explain audio codecs and formats used in game/simulation engines.		
78.03	Import audio into the game/simulation engine.		
78.04	Use appropriate naming conventions for audio assets.		
78.05	Describe the use of 3D and surround sound.		
78.06	Apply knowledge of distance/spatial effects including surround sound in a game/simulation.		
78.07	Contrast the audio environment as it relates to the visual environment.		
79.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
79.01	Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		
79.02	Explain emergency procedures to follow in response to workplace accidents.		
79.03	Create a disaster and/or emergency response plan.		
80.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
80.01	Employ leadership skills to accomplish organizational goals and objectives.		
80.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
80.03	Conduct and participate in meetings to accomplish work tasks.		
80.04	Employ mentoring skills to inspire and teach others.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
81.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
81.01	Identify and demonstrate positive work behaviors needed to be employable.		
81.02	Develop personal career plan that includes goals, objectives, and strategies.		
81.03	Examine licensing, certification, and industry credentialing requirements.		
81.04	Maintain a career portfolio to document knowledge, skills, and experience.		
81.05	Evaluate and compare employment opportunities that match career goals.		
81.06	Identify and exhibit traits for retaining employment.		
81.07	Identify opportunities and research requirements for career advancement.		
81.08	Research the benefits of ongoing professional development.		
81.09	Examine and describe entrepreneurship opportunities as a career planning option.		
82.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:		
82.01	Identify and describe the services and legal responsibilities of financial institutions.		
82.02	Describe the effect of money management on personal and career goals.		
82.03	Develop a personal budget and financial goals.		
82.04	Complete financial instruments for making deposits and withdrawals.		
82.05	Maintain financial records.		
82.06	Read and reconcile financial statements.		
82.07	Research, compare and contrast investment opportunities.		

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Video/Special Effects**
Course Number: **8208240**
Course Credit: **1**

Course Description:

This course is focused on students acquiring skills in designing, producing, editing, and integrating video and special effects into a game or simulation application.

Florida Standards			Correlation to CTE Program Standard #
66.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
66.01	Key Ideas and Details		
66.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
66.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
66.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
66.02	Craft and Structure		
66.02.1		Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
66.02.2		Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
66.02.3		Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
66.03	Integration of Knowledge and Ideas		

Florida Standards			Correlation to CTE Program Standard #
	66.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	66.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	66.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
66.04	Range of Reading and Level of Text Complexity		
	66.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	66.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
67.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
67.01	Text Types and Purposes		
	67.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	67.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
67.02	Production and Distribution of Writing		
	67.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	67.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	67.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.WHST.2.6	
	67.03 Research to Build and Present Knowledge		
	67.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	67.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	67.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	67.04 Range of Writing		
	67.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
68.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Audio/Video Effects.		
	68.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
	68.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
	68.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
	68.04 Model with mathematics. MAFS.K12.MP.4.1		
	68.05 Use appropriate tools strategically. MAFS.K12.MP.5.1		
	68.06 Attend to precision. MAFS.K12.MP.6.1		
	68.07 Look for and make use of structure. MAFS.K12.MP.7.1		
	68.08 Look for and express regularity in repeated reasoning.		

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
83.0	Understand the history of video effects in the entertainment. – The student will be able to:		
83.01	Understand the role of video in a visual presentation.		
83.02	Understand how video effects can establish or reinforce the mood.		
83.03	Understand the importance of production value.		
83.04	Understand the history of video effects production.		
83.05	Understand the technology incorporated into the production video and video effects.		
84.0	Understand the various job titles and responsibilities video technician as it relates to game and simulation design. – The student will be able to:		
84.01	Identify the job titles of video technicians and artist game project.		
84.02	Demonstrate the ability to work as part of a video production team.		
84.03	Perform the role of the video technical director for a game/simulation project.		
84.04	Perform the role of video editor for a game/simulation project.		
84.05	Perform the role of camera operator for a game/simulation project.		
84.06	Perform the role of special effects coordinator for a game/simulation project.		
84.07	Perform the role of video recording operator for a game/simulation project.		
84.08	Perform the role of video effects artist for a game/simulation project.		
84.09	Perform the role of compositor for a game/simulation project.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
85.0	Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets. – The student will be able to:		
85.01	Understand the use of “Fair use and Fair Dealing”.		
85.02	Understand the transfer and licensing of creative works.		
85.03	Understand the use of “exclusive rights” to intellectual creations.		
85.04	Demonstrate the use of digital watermarking.		
86.0	Demonstrate a knowledge of production writing as it relates to game and simulation design. – The student will be able to:		
86.01	Explain the job of a scriptwriter and outline the elements of a script.		
86.02	Demonstrate ability to breakdown a script into video production elements.		
86.03	Demonstrate ability to write simple dialog.		
86.04	Demonstrate ability to translate script elements into production schedule.		
86.05	Demonstrate ability to write narration or instructions for game/simulation.		
87.0	Demonstrate appropriate acting skills. – The student will be able to:		
87.01	Demonstrate the ability to read aloud in a professional manner.		
87.02	Demonstrate the ability to receive and properly act upon direction given by the producer/director.		
87.03	Understand the concept of acting and playing a role while speaking.		
87.04	Perform the various assignments in a professional manner according to industry standards.		
88.0	Demonstrate basic video production. – The student will be able to:		
88.01	Use current industry standard production video equipment.		
88.02	Operate camera in studio and location (field) production environments.		
88.03	Demonstrate understanding of digital video storage concepts and digital storage media.		
88.04	Demonstrate knowledge of and the ability to operate digital recording decks, and other digital storage devices.		
88.05	Identify and select microphones for production needs.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	88.06 Determine appropriate lighting needs for production settings.		
	88.07 Identify location and studio lighting types, method of use and application.		
89.0	Demonstrate set-up and configuration of a computer for video applications. – The student will be able to:		
	89.01 Install basic peripheral devices related to video programs.		
	89.02 Install and configure software related to video programs.		
	89.03 Demonstrate basic knowledge of computer system requirements.		
	89.04 Demonstrate basic knowledge of installing plug-ins or additional audio source material such as beats and or samples.		
	89.05 Understand the signal flow of a digital video workstation.		
90.0	Demonstrate the basic operation of a video workstation. – The student will be able to:		
	90.01 Demonstrate knowledge of the digital video workstation interface.		
	90.02 Demonstrate a working familiarity and understanding of the function and operation of digital video workstations.		
	90.03 Demonstrate ability to edit, cut, erase, and insert video utilizing various digital production techniques.		
	90.04 Record video directly to the digital video workstation.		
	90.05 Demonstrate knowledge of editing video according to message.		
	90.06 Demonstrate skill in using video effects and plug-ins.		
	90.07 Prepare a video project for final compositing and export.		
	90.08 Transfer video files between various video software applications.		
	90.09 Export finished video.		
91.0	Incorporate video assets into game/simulation engine. – The student will be able to:		
	91.01 Demonstrate knowledge of the video effects workflow.		
	91.02 Demonstrate knowledge of video codecs and formats used in game/simulation engines.		
	91.03 Demonstrate knowledge and ability to import video into the game/simulation engine.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
91.04 Use appropriate naming conventions for video assets.		
91.05 Understand the use of placing video assets into a 3D environment.		
91.06 Demonstrate knowledge of distance/spatial video effects in relation to sound effects in a game/simulation.		
91.07 Understand the audio environment as it relates to the visual environment.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Game/Simulation/Animation Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8208300
CIP Number	0550041116
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @7 7G COMP PROG 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Game/Simulation Designer, Game Programmer, and Game Software Developer in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to practical experiences in game/simulation conceptualization, design, storyboarding, development methodologies, essential programming techniques, and implementation issues. Specialized programming skills involving advanced mathematical calculations and physics are also integrated into the curriculum.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8207310	Digital Information Technology **OR**	1 credit	15-1199	2	PA
	8208110	Game & Simulation Foundations	1 credit		2	VO
	8208120	Game & Simulation Design	1 credit		2	VO
B	8208330	Game & Simulation Programming	1 credit	15-1131	3	VO
C	8208340	Multi-User Game & Simulation Programming	1 credit	15-1131	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
8208110	1/87 1%	14/80 18%	23/83 28%	9/69 13%	28/67 42%	6/70 9%	2/69 3%	28/82 34%	9/66 14%	34/74 46%	16/72 22%
8208120	6/87 7%	18/80 23%	27/83 33%	13/69 19%	31/67 46%	13/70 19%	6/69 9%	31/82 38%	12/66 18%	41/74 55%	20/72 28%
8208330	20/87 23%	20/80 25%	1/83 1%	20/69 29%	1/67 1%	20/70 29%	20/69 29%	1/82 1%	15/66 23%	1/74 1%	20/72 28%
8208340	22/87 25%	33/80 41%	5/83 6%	27/69 39%	7/67 10%	24/70 34%	22/69 32%	9/82 11%	24/66 36%	5/74 7%	27/72 38%

** *Alignment pending review*

\# *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
8208110	14/67 21%	9/75 12%	13/54 24%	#	#	#	#
8208120	16/67 24%	11/75 15%	17/54 31%	7/46 15%	7/45 16%	7/45 16%	7/45 16%
8208330	8/67 12%	18/75 24%	8/54 15%	#	#	#	#
8208340	8/67 12%	14/75 19%	8/54 15%	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Program Recommendations

This program is project-based and focuses on broad, transferable skills and stresses understanding and demonstration of the following rudiments of the game and simulation industry: production planning, elements of production design, storyboarding, elements of visual design, integration of digital audio and digital video into new game/simulation productions, programming for single and multi-user environments, delivery systems, and collaboration/teamwork.

The Foundations and Design courses should be taken in sequence prior to the Programming and Multi-User Programming courses. The Programming and Multi-User Programming courses may be taken concurrently. It is highly recommended that students complete a programming course prior to taking the last two courses of this program. Digital Information Technology may be taken concurrently with either the Foundations course or the Design course.

The Programming (8208330) and Multiuser Programming (8208340) courses should be offered with a concentration on one programming language to ensure students are prepared for industry certifications.

The Game/Simulation/Animation Advanced Applications program (8208400) is an appropriate follow-on capstone program.

The Game/Simulation/Animation Programming program lends itself to integration of the core academic subjects of language arts, math, science, visual arts, and social studies into project activities. It is through a balanced and integrated curriculum that students attain the attitudes, skills, and knowledge needed to compete successfully in today's work force. To achieve total curriculum integration, academic and career and technical education teachers should be scheduled with common planning times.

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Programming.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Programming.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Programming.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game.
19.0 Use information technology tools.
20.0 Design and create a playable game.
21.0 Categorize the different gaming genres.
22.0 Categorize different gaming platforms.
23.0 Understand the historical significance of electronic and non-electronic games.
24.0 Describe the trends in current and future game development.
25.0 Identify the business model commonly used in game development industries.
26.0 Examine and categorize the significant processes in the production of games.
27.0 Understand the core tasks and challenges that face a video game design team.
28.0 Identify legal issues that affect games, developers and players.
29.0 Demonstrate the professional level of written and oral communication required in the game development industry.

30.0 Investigate career opportunities in the game industry.
31.0 Demonstrate an understanding of the vocabulary of the industry for discussing games and play.
32.0 Demonstrate research and information fluency.
33.0 Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design.
34.0 Identify popular games and identify commonality between them.
35.0 Understand the general procedure and requirements of game design.
36.0 Explore the methods used to create and sustain player immersion.
37.0 Become familiar with popular game tools such as DirectX, 3DMax, and different gaming engines.
38.0 Demonstrate language arts knowledge and skills.
39.0 Demonstrate mathematics knowledge and skills.
40.0 Demonstrate science knowledge and skills.
41.0 Create a working game or simulation individually or as part of a team.
42.0 Describe the game development life cycle.
43.0 Identify hardware constraints on video games including processors and I/O devices.
44.0 Understand the general principles of storytelling.
45.0 Understand character archetypes and character design.
46.0 Understand the use of storyboarding in game design.
47.0 Develop a game design document or cut.
48.0 Understand outlining in game designs.
49.0 Explore elements of puzzle design.
50.0 Discuss game designer strategy considerations.
51.0 Understand the process of creating and designing player choice.
52.0 Create and design the game flow as it relates to story and plot.
53.0 Assess common principles and procedures in game flow design.
54.0 Describe rule creation elements of player challenge.
55.0 Identify tools and software commonly used in game development.
56.0 Understand the technical methodologies for integrating digital media into a game or simulation.
57.0 Identify commonly used art and animation production tools in the game design industry.
58.0 Understand the general concepts of environmental design.
59.0 Describe how environmental design is used in conjunction with game level design.
60.0 Describe pertinent issues facing game designers.
61.0 Describe Monte Carlo simulation as it relates to game design.
62.0 Understand the use of inventory systems in game design.
63.0 Use information technology tools.
64.0 Describe the roles within a game studio.
65.0 Describe the importance of professional ethics and legal responsibilities.
66.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Programming.
67.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Programming.
68.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Programming.

69.0 Identify functions of information processing.
70.0 Test programs.
71.0 Plan program design.
72.0 Code programs.
73.0 Perform program maintenance.
74.0 Create and maintain documentation.
75.0 Evaluate assigned game programming tasks.
76.0 Implement enhanced program structures.
77.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
78.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
79.0 Demonstrate personal money-management concepts, procedures, and strategies.
80.0 Identify and describe basic network terminology and network security.
81.0 Game configuration.
82.0 Test programs.
83.0 Plan program design.
84.0 Create and maintain documentation.
85.0 Code programs.
86.0 Demonstrate an understanding of operating systems, environments, and platforms.
87.0 Implement enhanced program structures.
88.0 Implement multimedia programming.
89.0 Develop an understanding of programming techniques and concepts.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

OR

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Foundations**
Course Number: **8208110**
Course Credit: **1**

Course Description:

This course is designed to provide an introduction to game and simulation concepts and careers, the impact game and simulation has on society and industry, and basic game/simulation design concepts such as rule design, play mechanics, and media integration. This course compares and contrasts games and simulations, key development methodologies and tools, careers, and industry-related information. This course also covers strategies, processes, and methods for conceptualizing a game or simulation application; storyboarding techniques; and development tools.

Hands-on activities using an entry-level game development tool should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation of a playable game.**

Game & Simulation Creation

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

Florida Standards				Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Programming.			
	01.01	Key Ideas and Details		
		01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
		01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
		01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02	Craft and Structure		

Florida Standards			Correlation to CTE Program Standard #
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Programming.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
02.02.1		Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2		Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3		Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
02.03.1		Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2		Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3		Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
02.04.1		Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Programming.		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		

Florida Standards	Correlation to CTE Program Standard #
03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game. – The student will be able to:		
18.01 Use industry standard game design production documents to create a game design production plan.		SC.912.N.1.1
19.0 Use information technology tools. – The student will be able to:		SC.912.P.10.1; 10.2; 10.5; 10.16; 12.2
19.01 Use personal information management (PIM) applications to increase workplace efficiency.		
19.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
20.0 Design and create a playable game. – The student will be able to:		
20.01 Use a number of computer tools to enhance and ease game programming and artistry.		
20.02 Use a game engine to create a playable game.		SC.912.N.1.1
20.03 Use animated objects.		SC.912.N.1.1
20.04 Integrate sound and music to enhance the game experience.		SC.912.N.3.5
20.05 Test and debug to game completion.		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
21.0	Categorize the different gaming genres. – The student will be able to:		
21.01	Research, compare and categorize the different gaming genres.		SC.912.L.15.4
21.02	Analyze examples of different gaming genres.		SC.912.L.15.6
21.03	Define and use the necessary vocabulary related to gaming and the different genres.		
22.0	Categorize different gaming platforms. – The student will be able to:		
22.01	Research, compare and categorize different gaming platforms.		SC.912.N.1.1
22.02	Analyze the distinctive features of each system.		SC.912.L.15.6
22.03	Define the target audience for different platforms based on features, available games, and price of system and games.		
22.04	Define and use the necessary vocabulary related to gaming platforms.		
23.0	Understand the historical significance of electronic and non-electronic games. – The student will be able to:		SC.912.P.10.18; 10.20.
23.01	Discuss the history of non-electronic games.		SC.912.N.3.2
23.02	Describe the history and theory of mainstream and experimental media including radio, movies, television, art, and theatre.		SC.912.N.2.4
23.03	Explain the historical timeline of electronic games, marking the significant highlights in their evolution.		
24.0	Describe the trends in current and future game development. – The student will be able to:		SC.912.N.1.7; .3.5; SC.912.P.10.2; 10.10; 12.2; 12.3; 12.5; 12.6.
24.01	Determine and analyze the significant trends in game development in the past two decades.		SC.912.N.1.1
24.02	Research and brainstorm the possibilities for the future of electronic games based on current and emerging technologies and future predictions.		SC.912.N.1.1
25.0	Identify the business model commonly used in game development industries. – The student will be able to:		
25.01	Identify, define and discuss the different ways games are funded, marketed and sold.		
25.02	Identify and describe licensing management for different gaming platforms.		
25.03	Discuss the product value and business differences between major game platforms.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
25.04	Identify successful business models and analyze various facets of those models, such as market analysis, marketing strategy, and product value.		
25.05	Discuss the opportunities available to independent game developers and entrepreneurs in the mobile application market.		
26.0	Examine and categorize the significant processes in the production of games. – The student will be able to:		SC.912.N.1.1; 1.5
26.01	Discuss the relationships between publishers, developers, distributors, marketers, and retailers.		
26.02	Identify processes of development including content creation, team roles, design documentation, and process management.		
26.03	Explore and describe the effects of globalization on the design and production of video games.		
27.0	Understand the core tasks and challenges that face a video game design team. – The student will be able to:		SC.912.N.1.1
27.01	Identify and define the roles and responsibilities of team members on a video game design team.		SC.912.L.14.2
27.02	Describe the effects of group dynamics and the importance of team building for a design team.		
27.03	Explore and discuss methods of communications and scheduling for design teams.		
27.04	Describe the importance and interrelationship between development schedule and budget constraints in video game design.		
28.0	Identify legal issues that affect games, developers and players. – The student will be able to:		
28.01	Define and discuss intellectual property and contract law as it relates to the gaming industry.		
28.02	Describe legal and liability issues that could affect online communities.		SC.912.N.1.3
28.03	Compare and contrast government and industry content regulation and industry ratings of video games.		
29.0	Demonstrate the professional level of written and oral communication required in the game development industry. – The student will be able to:		SC.912.N.1.1
29.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.		SC.912.N.1.1
29.02	Organize ideas and communicate oral and written messages appropriate for the game development industry environment.		SC.912.N.1.1
29.03	Identify, define, and discuss terminology appropriate for both internal and external communications in the game development industry environment.		
29.04	Compose electronic documents used to facilitate formal and informal communication in the game industry such as letters, reports, memos, emails, presentations, budgets, charts and calendars.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
30.0	Investigate career opportunities in the game industry. – The student will be able to:		SC.912.N.4.2
30.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.		
30.02	Analyze job and career requirements and relate career interests to opportunities in the global economy.		
30.03	Describe job requirements for a variety of occupations within the game development industry.		
30.04	Identify current employment trends and career opportunities in the game industry.		
30.05	Evaluate personal aptitude and skills to match specific employment opportunities.		
30.06	Develop an educational plan to acquire the skills and requirements of a selected employment opportunity within the game industry.		
31.0	Demonstrate an understanding of the vocabulary of the industry for discussing games and play. – The student will be able to:		
31.01	Identify, define, and discuss professional game design and analysis terminology appropriate for internal and external communications in a game design environment.		
31.02	Identify and define the vocabulary used by game players and online gaming communities.		
32.0	Demonstrate research and information fluency. - The student will be able to:		
32.01	Locate, analyze, process, and organize data from multiple sources including the Internet.		
32.02	Play games to research and collect game play data.		
32.03	Evaluate, analyze and document game styles and playability.		
32.04	Determine the dramatic elements in games, including kinds of fun, player types and nonlinear storytelling.		
33.0	Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow and game design. – The student will be able to:		
33.01	Test and analyze games to determine the quality of rules, interfaces, navigation, performance, play, artistry and longevity in design and structure.		SC.912.N.1.1
33.02	Research and evaluate the game analysis techniques used by the video game industry.		SC.912.N.1.1
33.03	Identify the key elements in a game and make intelligent judgments about whether the game succeeded or failed in its objectives.		SC.912.N.1.1
33.04	Evaluate professional reviews and write a critical analysis of a current video game.		SC.912.N.1.1
34.0	Identify popular games and identify commonality between them. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	34.01 Analyze and deconstruct game environments and interactions.		SC.912.N.1.1
	34.02 Compare and contrast the top selling video games in terms of player interaction, plot complexity, and reward.		
	34.03 Categorize gameplay elements by player type. (killer, talker, explorer and achiever)		
35.0	Understand the general procedure and requirements of game design. – The student will be able to:		SC.912.N.1.7
	35.01 Describe the design process from conception to production.		SC.912.N.1.1
	35.02 Explain the iterative nature of game design through the different stages of design iterations including pre-alpha, alpha, beta, release candidate, going gold and support.		
	35.03 Develop design plans, for example, character sketches, documentation and storyboards for proposed games.		
36.0	Explore the methods used to create and sustain player immersion. – The student will be able to:		
	36.01 Research and define the term “player immersion”.		
	36.02 Explore and explain the factors that create player immersion in a game.		
	36.03 Examine popular games and explain the methods each game uses to increase player immersion.		
37.0	Become familiar with popular game technology such as DirectX, 3DMAX, and different gaming engines. – The student will be able to:		
	37.01 Identify and discuss the popular game development tools currently used in the industry.		
	37.02 Identify and discuss popular gaming engines.		
	37.03 Research and analyze the uses for different game development tools.		SC.912.N.1.1
38.0	Demonstrate language arts knowledge and skills. – The student will be able to:		
	38.01 Locate, comprehend and evaluate key elements of oral and written information.		SC.912.N.1.1
	38.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
	38.03 Present information formally and informally for specific purposes and audiences.		SC.912.N.1.1
39.0	Demonstrate mathematics knowledge and skills. – The student will be able to:		
	39.01 Demonstrate knowledge of arithmetic operations.		SC.912.P.10.3
	39.02 Analyze and apply data and measurements to solve problems and interpret documents.		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	39.03 Construct charts/tables/graphs using functions and data.	MAFS.912.F-IF.3.7	SC.912.N.1.1
40.0	Demonstrate science knowledge and skills. – The student will be able to:		
	40.01 Discuss the role of creativity in constructing scientific questions, methods and explanations.		SC.912.N.1.7
	40.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.		SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Design**
Course Number: **8208120**
Course Credit: **1**

Course Description:

This course covers fundamental principles of designing a game or a simulation application, rules and strategies of play, conditional branching, design and development constraints, use of sound and animation, design tools, and implementation issues. The content includes market research, product design documentation, storyboarding, proposal development, and presentation of a project report. Emphasis is placed on the techniques needed to develop well-documented, structured game or simulation programs. Extensive use is made of evaluating and analyzing existing games or simulations.

Hands-on activities using an entry-level game development tool should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation and presentation of a playable game with design documentation.**

Game/Simulation Project

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

Florida Standards				Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Programming.			
	01.01	Key Ideas and Details		
		01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
		01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
		01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02	Craft and Structure		

Florida Standards			Correlation to CTE Program Standard #
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Programming.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
02.02.1		Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2		Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3		Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
02.03.1		Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2		Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3		Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
02.04.1		Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Programming.		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		

Florida Standards	Correlation to CTE Program Standard #
03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
41.0 Create a working game or simulation individually or as part of a team. – The student will be able to:		SC.912.N.1.1
41.01 Create a storyboard describing the essential elements, plot, flow, and functions of the game/simulation.	MAFS.912.G-MG.1.3	
41.02 Create a design specification document to include interface and delivery choices, rules of play, navigation functionality, scoring, media choices, start and end of play, special features, and development team credits.		
41.03 Using a simple game development tool, create a game or simulation.		SC.912.N.3.5
41.04 Present the game or simulation.		SC.912.N.3.5
42.0 Describe the game development life cycle. – The student will be able to:		SC.912.P.10.13; 10.14; 10.15; 10.18
42.01 Identify steps in the pre-production process including the proof of concept and market research.		
42.02 Describe the iterative prototyping process – Alpha, Beta, RTM.		
42.03 Determine platform, technology and scripting requirements.		
42.04 Implement techniques of scenario development, levels, and missions.		
42.05 Discuss game testing requirements and methods.		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	42.06 Identify and describe maintenance, upgrade and sequel issues.		
43.0	Identify hardware constraints on video games including processors and I/O devices. – The student will be able to:		
	43.01 Identify the different control systems for video games.		
	43.02 Compare and contrast personal computer and video game console hardware, including display systems.	MAFS.912.S-CP.1.1	
	43.03 Explain the factors that can limit the game-playing ability of personal computers.		SC.912.L.17.5
44.0	Understand the general principles of storytelling. – The student will be able to:		
	44.01 Identify the essential elements of a story.		
	44.02 Describe how creative writing is used as a game design tool.		
	44.03 Compare and contrast methods of delivering a story in a game.		
45.0	Understand character archetypes and character design. – The student will be able to:		
	45.01 Research and identify common character archetypes used in computer games.		
	45.02 Design character prototypes to physically match archetype.		
	45.03 Apply symbolize and semiotic design elements within character design to convey meaning.		
	45.04 Create character backstory and profile.		
46.0	Understand the use of storyboarding in game design. – The student will be able to:		
	46.01 Assess the techniques used in the gaming industry for rendering basic Game Design Art.		
	46.02 Describe how game layout charts are used in game design.		
	46.03 Describe how storyboards in the game design process can be used as a pre-development sales tool.		
	46.04 Analyze and compare the use of storyboards in the game design industry with regard to environmental illustrations, level designs, character designs, model sheets and GUI Designs.		
47.0	Develop a game design document or cut. – The student will be able to:		
	47.01 Evaluate and discuss the choice of delivery system.		
	47.02 Evaluate and discuss choices of genre, game design software, art, digital media, and animation software.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
47.03 Create a game strategy overview, character overview, and storyboard overview.		
47.04 Define the rules of play and multi-player options.		
47.05 Create the layout and interfaces overview and digital media overview.	MAFS.912.G-MG.1.3	
47.06 Determine the gameplay interaction requirements and create the progression levels overview.		
47.07 Define strategic positioning of game immersion dynamics and psychological effect.		SC.912.N.1.1
47.08 Identify hardware and software constraints.		SC.912.L.17.5
48.0 Understand outlining in game designs. – The student will be able to:		
48.01 Assess techniques of goal design in gaming.		
48.02 Describe the concept of nested victories.		
48.03 Discuss the use of players as agents of change.		
48.04 Compare and contrast examples of understandable context in gaming.		
48.05 Discuss the principles underlying the creation of understandable rules.		
48.06 Describe how skill building is used in game design.		
48.07 Describe conventional techniques of positive feedback.		
48.08 Discuss functional consistency as it relates to the use of interfaces.		
49.0 Explore elements of puzzle design. – The student will be able to:		SC.912.P.10.14; 10.15.
49.01 Describe the essential elements of a puzzle.		
49.02 Identify the different types of puzzles.		
49.03 Describe the basic principles of high-level puzzle design.		
49.04 Describe the basic principles of low-level puzzle design.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
50.0	Discuss game designer strategy considerations. – The student will be able to:		SC.912.L.17.15
50.01	Describe the use of artificial intelligence challenges in game design and the need for giving the player rest time between challenges.		
50.02	Evaluate the impact of randomness in game design especially as it pertains to pattern recognition.	MAFS.912.S-MD.1.1 MAFS.912.S-MD.1.2	
50.03	Identify techniques used in the industry to help the player to navigate.		
50.04	Explain the use of “just barely” victories and failures as an exciting and immersive technique.		
50.05	Assess techniques used to provide a range of challenges and appeal to a wide range of abilities.		
50.06	Describe the psychological cost of failure in games as it pertains to immersion and psychological effect.		
50.07	Identify methods of preparing the player for greater challenge while allowing for plot development as the story serves the game.		
51.0	Understand the process of creating and designing player choice. – The student will be able to:		
51.01	Discuss the principles of player-centric design.		
51.02	Research and correlate game complexity level to appropriate age group such that content matches user skill set required.		SC.912.N.1.1
51.03	Examine and discuss design elements that encourage continuous active engagement both mental and physical.		
51.04	Analyze design elements that maintain player interest and vary the degree of challenge.		SC.912.N.1.1
51.05	Discuss the need for a balance of design elements for the purpose of rewarding and frustrating players.		
52.0	Create and design the game flow as it relates to story and plot. – The student will be able to:		
52.01	Identify techniques of introducing the story plot and beginning play.		
52.02	Describe story plot development techniques for the middle of play in game design.		
52.03	Analyze and discuss planning techniques for climax and finale of games.		
53.0	Assess common principles and procedures in game flow design. – The student will be able to:		
53.01	Assess missions and scenarios game flow techniques.		
53.02	Describe common use of mission design and campaigns.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	53.03 Evaluate usage of static versus dynamic campaigns.		
54.0	Describe player challenge rule creation elements. – The student will be able to:		
	54.01 Research common design methods for clearing obstacles or series of obstacles.		SC.912.N.1.1
	54.02 Describe common design elements introducing skill, luck and combinations including escalating challenges to games.		
	54.03 Identify common design elements used to vary weapons, characters and tools.		
	54.04 Discuss the incorporation of risk reward and adaptive challenges (AI).		
	54.05 Evaluate industry use of boss encounters in games.		
	54.06 Analyze and discuss design considerations from the perspective of other players and multi-player environments.		
55.0	Identify tools and software commonly used in game development. – The student will be able to:		
	55.01 Identify and discuss the popular game development tools currently used in the industry.		
	55.02 Identify and discuss popular gaming engines.		
	55.03 Identify and discuss popular world building tools.		
56.0	Understand the technical methodologies for integrating digital media into a game or simulation. – The student will be able to:		
	56.01 Survey and discuss the use of naming conventions and temp sounds.		
	56.02 Analyze and discuss methods of matching sound effects to art assets.		
	56.03 Identify and categorize commonly used technology sound engine integration equipment.		
	56.04 Identify and discuss resources such as sound effects libraries.		SC.912.P.10.21
	56.05 Examine methods of sound implementation and associated software.		
	56.06 Describe how and why digital video may be integrated into a game or simulation design.		
	56.07 Describe how special effects differ from animation.		
57.0	Identify commonly used art and animation production tools in the game design industry. – The student will be able to:		
	57.01 Identify, categorize and discuss art and animation tools commonly used in game design.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
58.0	Understand the general concepts of environmental design. – The student will be able to:		
58.01	Survey and evaluate commonly used concept art.		
58.02	Create a world sketch with particular attention to maintaining continuity of style.		
58.03	Describe the emotional/psychological aspects of environmental design that signify mood, façade of freedom, and resource struggling.		
59.0	Describe how environmental design is used in conjunction with game level design. – The student will be able to:		
59.01	Examine and evaluate examples of focus on a theme.		
59.02	Describe methods of creating a purposeful architecture giving consideration to continuity and themes and taking advantage of revisiting.		
59.03	Consider and discuss environmental design elements for multi-player or single player games.		
59.04	Describe the history of creating shifts in game design environments and embracing novel ideas.		
59.05	Identify and discuss environmental design pitfalls such as red herrings and cookie-cutter layouts.		
60.0	Describe pertinent issues facing game designers. – The student will be able to:		
60.01	Discuss the meaning of simulation and give examples of simulation and complexity including architecture, exposure, concealment and heuristics.		
60.02	Describe applied event modeling including goal discovery, map making, event exploration, developing incentives and learning in event modeling for games.		
60.03	Explain the concepts of modes of understanding, inductive and iconic logic, significance and saturation in event modeling for game design.		
61.0	Describe Monte Carlo simulation as it relates to game design. – The student will be able to:		SC.912.P.8.7; 10.1; 10.2; 10.4; 10.5; 10.10; 12.3; 12.4; 12.5; 12.6; SC.912.L.14.16; 17.5; 17.15; SC.912.N.1.7
61.01	Discuss the process of specifying events including contexts of simulation, translating event models to simulations, formalizing thematic objectives, prototyping, interface design and use cases with modeling.		
61.02	Discuss the process of designing entities including behavior and entity graphics.		
61.03	Describe the implementation of entities including enumerating animations, playing with time, creating events, adding an entity class, and creating entity events and behaviors.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
61.04	Analyze event modeling in creating a world including the creation of a world class, adding and removing entities, accessing entities, updating and rendering, adding scene hierarchies and handling world events.		
61.05	Assess and discuss AI and physics issues for simulation including AI event contexts, adding intelligence and gravity, adding collision detection, updating for collisions and applying mass and force.		SC.912.P.10.6, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.12.4, SC.912.P.12.5
61.06	Discuss environmental elements of simulation including logic, cognitive saturation, systems and interpretation, context of reality, shadows and lighting.		
61.07	Discuss the simulation of physical systems such as trees and forests and related events such as fires, or insect swarms such as beehives, bird flocks or anthills.		
61.08	Describe the simulation of social and economic systems including practical applications, historical precedents, modeling for community events, creation of communities including structures, states events and rendering and altering building states, population behaviors, and controlling influences.		
61.09	Describe the process of testing simulations and event models including effectiveness, diagrammatic systems evaluation, context influence, path transitions and assessing messages.		SC.912.N.1.1
62.0	Understand the use of inventory systems in game design. – The student will be able to:		
62.01	Discuss the various methods of describing items in player's inventory in contemporary game design.		
62.02	Review and discuss industry methods of communicating how inventory items can have an effect on game play.		
63.0	Use information technology tools. – The student will be able to:		
63.01	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		SC.912.N.1.1
63.02	Employ computer operations applications to access, create, manage, integrate, and store information.		
63.03	Employ collaborative/groupware applications to facilitate group work.		
64.0	Describe the roles within a game studio. – The student will be able to:		
64.01	Describe the nature and types of business organizations.		
64.02	Explain the effect of key organizational systems on performance and quality.		
64.03	List and describe quality control systems and/or practices common to the workplace.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	64.04 Explain the impact of the global economy on business organizations.		SC.912.N.4.2
65.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
	65.01 Evaluate and justify decisions based on ethical reasoning.		SC.912.L.16.10
	65.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		
	65.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.		
	65.04 Interpret and explain written organizational policies and procedures.		

Florida Department of Education
Student Performance Standards

Course Title: **Game & Simulation Programming**
Course Number: **8208330**
Course Credit: **1**

Course Description:

This course is focused on students acquiring the appropriate programming skills for rendering a game or simulation product, including program control, conditional branching, memory management, score-keeping, timed event strategies and methodologies, and implementation issues.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

Florida Standards			Correlation to CTE Program Standard #
66.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Programming.		
	66.01 Key Ideas and Details		
	66.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	66.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	66.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	66.02 Craft and Structure		
	66.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	66.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	66.02.3	Analyze the author's purpose in providing an explanation, describing a	

Florida Standards			Correlation to CTE Program Standard #
		procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
66.03	Integration of Knowledge and Ideas		
	66.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	66.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	66.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
66.04	Range of Reading and Level of Text Complexity		
	66.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	66.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
67.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Programming.		
67.01	Text Types and Purposes		
	67.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	67.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
67.02	Production and Distribution of Writing		
	67.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	67.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.WHST.2.5	
	67.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
67.03	Research to Build and Present Knowledge		
	67.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	67.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	67.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
67.04	Range of Writing		
	67.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
68.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Programming.		
68.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
68.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
68.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
68.04	Model with mathematics. MAFS.K12.MP.4.1		
68.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
68.06	Attend to precision. MAFS.K12.MP.6.1		

Florida Standards	Correlation to CTE Program Standard #
68.07 Look for and make use of structure. MAFS.K12.MP.7.1	
68.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
69.0 Identify functions of information processing. – The student will be able to:	MAFS.912.S-IC.2	
69.01 Identify characteristics of high-level languages.		
69.02 Identify characteristics of operating systems.		
69.03 Identify characteristics of a network.		
69.04 Identify needs for software development in the game/simulation industry.		
69.05 Identify causes of software development problems in the game/simulation industry.		
69.06 Identify most appropriate languages for solving game/simulation industry problems.		
69.07 Manipulate data between numbering systems.		SC.912.N.1.1
69.08 Identify how numeric and non-numeric data are represented in memory.		
69.09 Distinguish among integer, fixed-point, and floating-point calculations.		
70.0 Test programs. – The student will be able to:		
70.01 Develop a plan for testing programs.		
70.02 Develop test harnesses for use in program testing.		
70.03 Perform debugging activities.		
70.04 Distinguish among the different types of program and design errors.		
70.05 Evaluate program test results.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
70.06 Execute programs and subroutines as they relate to the total application.		
70.07 Use trace routines of compilers to assist in program debugging.		
70.08 Compile and run programs.		
70.09 Create a stable code base.		
71.0 Plan program design. – The student will be able to:		SC.912.N.1.1
71.01 Formulate a plan to determine program specifications individually or in groups.		
71.02 Use a graphical representation or pseudo code to represent the structure in a program or subroutine.		SC.912.N.1.1
71.03 Design programs to solve problems using problem-solving strategies.		
71.04 Prepare proper input/output layout specifications.		
71.05 Examine existing utility programs and subroutines for use with other programs.		
71.06 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.		
72.0 Code programs. – The student will be able to:		
72.01 Utilize reference manuals.		SC.912.N.1.1
72.02 Write programs according to recognized programming standards.		
72.03 Write internal documentation statements as needed in the program source code.		
72.04 Code programs in high-level languages for game/simulation applications.		
72.05 Write code that accesses sequential, random, and direct files.		
72.06 Code programs using logical statements (e.g., If-Then-Else, Do...While).		
72.07 Enter and modify source code using a program language editor.		
72.08 Code routines within programs that validate input data.		
72.09 Use the rounding function in calculations within programs.		
72.10 Write programs as part of a development team.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
72.11 Write event-driven programs.		
72.12 Write programs using timed-event strategies and methodologies.		
72.13 Write programs that include score keeping.		
73.0 Perform program maintenance. – The student will be able to:		SC.912.N.1.1
73.01 Review requested modification of programs and establish a plan of action.		
73.02 Design needed modifications in conformance with established standards.		
73.03 Code, test, and debug modifications prior to updating production code.		SC.912.N.1.1
73.04 Update production programs and documentation with changes.		
73.05 Analyze output to identify and annotate errors or enhancements.		SC.912.N.1.1
74.0 Create and maintain documentation. – The student will be able to:		SC.912.N.1.1
74.01 Write documentation to assist operators and end-users.		
74.02 Follow established documentation standards.		
74.03 Update existing documentation to reflect program changes.		
75.0 Evaluate assigned game programming tasks. – The student will be able to:		
75.01 Estimate the time necessary to write a program.		
76.0 Implement enhanced program structures. – The student will be able to:		
76.01 Write programs that include tables or arrays and routines for data entry and lookup.		SC.912.N.1.1
76.02 Write programs to import/export data from external sources.		SC.912.N.1.1
76.03 Write programs that use iteration.		SC.912.N.1.1
76.04 Write routines that incorporate “help” text.		
76.05 Write programs that read and write random files.		
76.06 Write interactive programs.		
76.07 Design screen layouts for use in interactive programs.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	76.08 Write programs using object-oriented languages.		
	76.09 Write programs that include data structures (e.g., stacks, queues, trees, linked lists).		
	76.10 Write programs that are event-driven to support player goals and actions.		
77.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
	77.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		SC.912.N.1.1
	77.02 Explain emergency procedures to follow in response to workplace accidents.		SC.912.N.1.1
	77.03 Create a disaster and/or emergency response plan.		SC.912.N.1.1
78.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
	78.01 Employ leadership skills to accomplish organizational goals and objectives.		
	78.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
	78.03 Examine licensing, certification, and industry credentialing requirements.		
	78.04 Maintain a career portfolio to document knowledge, skills, and experience.		
	78.05 Evaluate and compare employment opportunities that match career goals.		
	78.06 Identify and exhibit traits for retaining employment.		
	78.07 Identify opportunities and research requirements for career advancement.		
	78.08 Research the benefits of ongoing professional development.		
	78.09 Examine and describe entrepreneurship opportunities as a career planning option.		
79.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:		
	79.01 Identify and describe the services and legal responsibilities of financial institutions.		
	79.02 Describe the effect of money management on personal and career goals.		
	79.03 Develop a personal budget and financial goals.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
79.04 Complete financial instruments for making deposits and withdrawals.		
79.05 Maintain financial records.		
79.06 Read and reconcile financial statements.		
79.07 Research, compare and contrast investment opportunities		SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Multi-User Game & Simulation Programming**
Course Number: **8208340**
Course Credit: **1**

Course Description:

This course is focused on students acquiring the appropriate programming skills for rendering a game or simulation product, including program control, conditional branching, score-keeping, timed event strategies and methodologies, and implementation issues specific to multi-user game/simulation products.

Florida Standards			Correlation to CTE Program Standard #
66.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Game/Simulation/Animation Programming.		
66.01	Key Ideas and Details		
	66.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	66.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	66.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
66.02	Craft and Structure		
	66.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	66.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	66.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying	

Florida Standards			Correlation to CTE Program Standard #
		important issues that remain unresolved. LAFS.1112.RST.2.6	
66.03	Integration of Knowledge and Ideas		
	66.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	66.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	66.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
66.04	Range of Reading and Level of Text Complexity		
	66.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	66.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
67.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Game/Simulation/Animation Programming.		
67.01	Text Types and Purposes		
	67.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	67.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
67.02	Production and Distribution of Writing		
	67.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	

Florida Standards			Correlation to CTE Program Standard #
	67.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	67.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	67.03	Research to Build and Present Knowledge	
	67.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	67.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	67.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	67.04	Range of Writing	
	67.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
68.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Programming.		
	68.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	68.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	68.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	68.04	Model with mathematics. MAFS.K12.MP.4.1	
	68.05	Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.5.1	
68.06 Attend to precision. MAFS.K12.MP.6.1	
68.07 Look for and make use of structure. MAFS.K12.MP.7.1	
68.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
80.0 Identify and describe basic network terminology and network security. – The student will be able to:		
80.01 Define networking and describe the purpose of a network.		
80.02 Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).		SC.912.L.17.9
80.03 Describe the various types of network topologies.		
80.04 Describe the various types of game protocols		
80.05 Demonstrate knowledge of general security concepts.		
80.06 Develop an awareness of communication security concepts.		
80.07 Develop an awareness of network infrastructure security.		
80.08 Describe the various types of multiplayer game architectures		
80.09 Identify networking and server design requirements for multi-player games		
80.10 List and describe performance metrics for networked games		
81.0 Game configuration. – The student will be able to:		SC.912.N.1.1; 1.2; 1.4; 4.1; 4.2
81.01 Create a window to run a game.		
81.02 Describe and use appropriate game libraries to run a windowed game.		
81.03 Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available		SC.912.N.1.4

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
81.04	Troubleshoot problems with computer hardware based on different graphic modes of the game		
81.05	Describe ethical issues and problems associated with computer games.		SC.912.L.16.10, SC.912.N.4.2
81.06	Read and comprehend technical and non-technical reading assignments related to course content including trade journals, books, magazines and electronic sources.		
81.07	Respond to and utilize information derived from multiple sources (e.g., written documents, instructions, e-mail, voice mail) to solve business problems and complete business tasks.		SC.912.N.1.4
81.08	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.		SC.912.N.1.1
81.09	Identify characteristics of operating systems and graphics pipeline		
81.10	Distinguish among integer and floating-point bounding box collision calculations...		
81.11	Illustrate various configurations of software libraries.		
82.0	Test programs. – The student will be able to:		
82.01	Develop data for use in program testing.		SC.912.N.1.1
82.02	Perform debugging activities.		
82.03	Distinguish among the different types of program and design errors.		
82.04	Evaluate program test results.		SC.912.N.1.1
82.05	Execute programs and subroutines as they relate to the total application.		
82.06	Use trace routines of compilers to assist in program debugging.		
82.07	Compile and run programs.		
83.0	Plan program design. – The student will be able to:		SC.912.N.1.3; 1.7
83.01	Formulate a plan to determine program specifications individually or in groups.		SC.912.N.1.1
83.02	Use a graphical representation or pseudo code to represent the structure in a program or subroutine.		SC.912.N.1.1
83.03	Design programs to solve problems using problem-solving strategies.		SC.912.N.1.3
83.04	Prepare proper input/output layout specifications.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
83.05	Examine existing utility programs and subroutines for use with other programs.		
83.06	Manually trace the execution of programs and verify that programs follow the logic of their design as documented.		
84.0	Create and maintain documentation. – The student will be able to:		
84.01	Write documentation to assist operators and end-users.		SC.912.N.1.1
84.02	Follow established documentation standards.		SC.912.N.1.1
84.03	Update existing documentation to reflect program changes.		
85.0	Code programs. – The student will be able to:		SC.912.P.12.1; 12.2; 12.3; 12.5; 12.6; 10.18; 10.20; 10.22.
85.01	Utilize reference manuals.		SC.912.N.1.1, SC.912.N.1.4
85.02	Write programs according to recognized programming standards.		
85.03	Write internal documentation statements as needed in the program source code.		
85.04	Code programs in high-level languages for gaming and simulation applications.		
85.05	Write code that accesses sequential, indexed sequential, random, and direct files.		
85.06	Code programs using logical statements (e.g., if-then-else, do...while).		
85.07	Enter and modify source code using a program language editor.		
85.08	Code routines within programs that validate input data.		
85.09	Use the rounding function in calculations within programs.		
85.10	Write programs that display text		
85.11	Demonstrate proficiency in drawing lines using graphic primitive functions.		
85.12	Demonstrate proficiency in drawing rectangles using graphic primitive functions.		
85.13	Demonstrate proficiency in drawing circles using graphic primitive functions.		
85.14	Demonstrate proficiency in drawing ellipses using graphic primitive functions.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
85.15 Demonstrate proficiency in drawing polygons using graphic primitive functions.		
85.16 Write programs that use composite graphic objects.		
85.17 Write programs that load a bitmap for background.		
85.18 Write programs that use a sprite handler.		
85.19 Write programs that use animation.		
85.20 Write programs that use scrolling.		
85.21 Write programs that use transparency.		
86.0 Demonstrate an understanding of operating systems, environments, and platforms. – The student will be able to:		
86.01 Identify various types of operating systems/environments for different computer hardware platforms.		
86.02 Assess and analyze the functions of different operating systems.		SC.912.N.1.1
86.03 Distinguish between different types of computer hardware platforms.		
87.0 Implement enhanced program structures. – The student will be able to:		SC.912.N.1.1
87.01 Write programs that include tables or arrays and routines for data entry and lookup.		
87.02 Write routines to sort arrays.		
87.03 Write programs that sort records in files.		
87.04 Write programs to process transactions.		
87.05 Write programs that use iteration.		
87.06 Write programs that read and write sequential files.		
87.07 Write programs that read and write random files.		
88.0 Implement multimedia programming. – The student will be able to:		SC.912.P.10.1; 10.2; 10.5; 12.4; 12.5; 12.6.
88.01 Demonstrate proficiency in creating multiple composite objects.		
88.02 Demonstrate proficiency in moving composite graphics objects.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
88.03	Demonstrate proficiency in rotating composite graphics objects by hand.		
88.04	Distinguish between flock and flee artificial intelligence algorithms.		
88.05	Write programs that use blitting.		
88.06	Simulate circular game board.		
88.07	Demonstrate proficiency in creating a firing simulation.		
88.08	Identify the basic constructs used in bounding box collision algorithm.		
88.09	Identify the basic constructs used in truer bounding box collision.		
88.10	Demonstrate proficiency in creating a creating a bouncing simulation.		
88.11	Simulate pattern based movement.		
88.12	Simulate multiple sprites movement.		
88.13	Identify the basic constructs used in keyboard input.		
88.14	Identify the basic constructs used in mouse input.		
88.15	Identify the basic constructs used in double buffering.		
89.0	Develop an understanding of programming techniques and concepts. – The student will be able to:		SC.912.N.1.1
89.01	Identify the basic constructs used in structured programming.		
89.02	Distinguish between top-down and bottom-up design.		
89.03	Distinguish between iteration and recursion.		
89.04	Evaluate Boolean expressions.		
89.05	Distinguish between interpreters and compilers.		

Information
Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If

needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Game/Simulation/Animation Advanced Applications**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8208400
CIP Number	0550041117
Grade Level	9-12, 30, 31
Standard Length	1 credit
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @ 7 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program is designed to prepare students for employment as a Game/Simulation Project Manager.

The content includes but is not limited to a capstone opportunity for students to learn and apply principles of project management, team-building, scheduling, coordination and budgeting to create a complete game or simulation product.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of a single capstone course with one occupational completion point. A student who completes the applicable competencies may exit as an occupational completer.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8208400	Game, Simulation, & Animation Advanced Applications	1 credit	15-1199	2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8208400	#	#	#	#	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8208400	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

The Game, Simulation, & Animation Advanced Applications program **must** include the following components:

Pre-Project Planning Conference: The teacher and all team members must participate in a pre-project planning conference, which is essential to designing advanced learning experiences that are appropriate for each individual's learning needs and career interests. It is critical that all parties involved understand and agree on time schedules, expectations, advanced learning applications and evaluation criteria.

Project Criteria: The following criteria shall be met when choosing the Game, Simulation, & Animation Advanced Applications project:

The project must allow experiences that utilize both skills and knowledge directly related to the student's career interests and the Game, Simulation, & Animation Education program in which the student is enrolled or has completed.

The project must provide opportunities for members to experience a high level of interactivity related to the challenges of learning and applying advanced skills.

The project must provide a safe and ethically sound environment with up-to-date facilities and equipment.

Each student must maintain a journal with daily entries describing:

(a) Time spent on the project (log in and log out)
(b) Description of the activity for the period(s)
(c) Materials/equipment/fixtures used
(d) Problems identified
(e) Possible solutions to problems identified
(f) Work accomplished
(g) Solutions attempted
(h) Solutions that failed
(i) Which led to a new problem statement
(j) Video or Still Images of the project as it progresses.
(k) Plans, sketches, drawings, patterns, fixtures or other documentation of components designed or created

Each student will be expected to maintain a portfolio of the project according to the standards contained in this curriculum framework.

A progress report at mid-term will be given by each student to include a written research paper, that describes the area of investigation and an oral presentation to the remainder of the class and instructor or supervising faculty team, on the progress of the project, and all work accomplished. The progress report will be the basis for the mid-term evaluation grade.

A final oral progress report presentation at the end of the course will be given by each student or team that includes:
(a) a review of the portfolio and the journal,
(b) a demonstration of the project's final product
(c) results
(d) problems identified and solutions that worked or did not work, and
(e) a conclusion.

The final progress report will be the basis for the final exam evaluation grade.

When offered for multiple credits, the student should have varied learning experiences in order to provide maximum education exposure.

The course may be supervised by a faculty team consisting of the members of the faculty who will be granting the multiple credit(s) if that is the case.

Project Experience: This component shall provide a match between the student's career interests and a project based situation that will provide exposure to the broad aspects of the selected industry. The assigned tasks should allow a progression and rotation through experiences requiring a variety of knowledge, skills and abilities at increasingly higher levels related to the student's studies and career interests.

Supervision: Teacher-coordinators of the Game, Simulation, & Animation Advanced Applications project must monitor and support learning. Students must also be evaluated a minimum of once per grading period by the teacher-coordinator. The evaluation should assess how well the student is progressing toward goals established by the teacher-coordinator. Portfolio assessment, orchestrated by the teacher-coordinator, is a recommended method of student assessment.

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Advanced Applications.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Advanced Applications.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Advanced Applications.
04.0 Complete a skills inventory.
05.0 Demonstrate acceptable work values.
06.0 Demonstrate the ability to identify and solve problems.
07.0 Successfully work as a member of a team.
08.0 Manage time according to a plan.
09.0 Keep acceptable records of progress, problems and solutions.
10.0 Plan, organize and carry out a project plan.
11.0 Manage resources.
12.0 Use tools, materials, and processes in an appropriate and safe manner.
13.0 Demonstrate an understanding of the game and simulation development process.
14.0 Demonstrate appropriate scientific content related to the project.
15.0 Demonstrate appropriate mathematics content related to the project.
16.0 Research content related to the project and document the results.
17.0 Use presentation skills, and appropriate media to describe the progress, results and outcome of the experience.
18.0 Demonstrate competency in the area of expertise related to the Game, Simulation & Animation education program previously completed that this project is based upon.

Florida Department of Education
Student Performance Standards

Course Title: **Game, Simulation, & Animation Advanced Applications**
Course Number: **8208400**
Course Credit: **1**

Course Description:

This is a project-based capstone course to provide Game, Simulation & Animation students with the opportunity to develop a project from vision to reality. Students work in teams to research, plan, design, create, test, redesign, test again, and then produce a finished game or simulation product.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Game/Simulation/Animation Advanced Applications.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.2.6	
	01.03 Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
	01.04 Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Game/Simulation/Animation Advanced Applications.		
	02.01 Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.02 Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards			Correlation to CTE Program Standard #
		capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Game/Simulation/Animation Advanced Applications.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
04.0 Complete a safety skills inventory. – The student will be able to:		
04.01 Practice safety procedures while enrolled in this course.		
04.02 Demonstrate an understanding of safety and general policies and procedures.		
05.0 Demonstrate acceptable project values. – The student will be able to:		
05.01 Maintain a positive relationship with peers.		
05.02 Demonstrate adaptive self-management skills.		
05.03 Rotate through a wide variety of increasingly responsible experiences.		
05.04 Apply basic skills in communications, mathematics, and science appropriate to technological content and learning activities.		
06.0 Demonstrate the ability to identify and solve problems. – The student will be able to:		
06.01 Prepare a design brief for each step in the project plan to identify constraints or design boundaries.		
06.02 Identify possible solutions for each design brief.		
06.03 Complete research and development activities associated with each design brief.		
06.04 Document problems as they arise.		
06.05 Prepare a problem statement for any activity that is not successful.		
06.06 Identify possible solutions for the new problem statement.		
06.07 Continue the R & D process until workable solutions are found to each problem stated.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
07.0	Successfully work as a member of a team. – The student will be able to:		
07.01	Accept responsibility for specific tasks in a given situation.		
01.04	Document progress, and provide feedback on work accomplished in a timely manner.		
01.05	Complete assigned tasks in a timely and professional manner.		
01.06	Reassign responsibilities when the need arises.		
01.07	Complete daily tasks as assigned on one's own initiative.		
08.0	Manage time according to a plan. – The student will be able to:		
08.01	Set realistic time frames and schedules.		
08.02	Keep a written time sheet of work accomplished on a daily basis.		
08.03	Meet goals and objectives set by the team.		
08.04	Identify individual priorities.		
08.05	Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities as needed.		
09.0	Keep acceptable records of progress problems and solutions. – The student will be able to:		
09.01	Develop a record keeping system in the form of a log book to record daily progress.		
09.02	Use a project journal to identify problem statement.		
09.03	Develop a portfolio of work accomplished to include design drawings, research, drawings and plans, storyboards, models, mock-ups and prototypes.		
10.0	Plan, organize, and carry out a project plan. – The student will be able to:		
10.01	Determine the scope of a project.		
10.02	Organize the team according to individual strengths.		
10.03	Assign specific tasks within a team.		
10.04	Determine project priorities.		
10.05	Identify required resources.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
10.06	Plan research, design, development, and evaluation activities as required.		
10.07	Carry out the project plan to successful completion.		
11.0	Manage resources. – The student will be able to:		
11.01	Identify required resources for each stage of the project plan.		
11.02	Determine the methods needed to acquire needed resources.		
11.03	Demonstrate good judgment in the use of resources.		
11.04	Recycle and reuse resources where appropriate.		
11.05	Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.		
12.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:		
12.01	Identify the proper tool for a given job.		
12.02	Use tools and machines in a safe manner.		
12.03	Adhere to laboratory or job site safety rules and procedures.		
12.04	Identify the application of processes appropriate to the task at hand.		
12.05	Identify materials appropriate to their application.		
13.0	Demonstrate an understanding of the game and simulation development process. – The student will be able to:		
13.01	State the goals of the game or simulation clearly.		
13.02	Identify and write a plan to achieve each goal.		
13.03	Develop a list of materials and content required for each goal.		
13.04	Develop a step by step procedure for developing the game or simulation.		
13.05	Follow a written procedure.		
13.06	Record data from evaluation activities.		
13.07	Document conclusions and solutions based on evaluation results, observations and data.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
13.08	Document progress using a project log.		
13.09	Write an abstract describing the project plan.		
14.0	Demonstrate appropriate scientific content related to the project. – The student will be able to:		
14.01	Document how types of motion may be described, measured, and predicted.		
14.02	Demonstrate how types of force that act on an object and the effect of that force can be described, measured, and predicted.		
14.03	Document how the principles of Human Computer Interface (HCI) are incorporated into the project design.		
14.04	Demonstrate how science, technology, and society are interwoven and interdependent.		
15.0	Demonstrate appropriate mathematics content related to the project. – The student will be able to:		
15.01	Identify different ways numbers are represented and used.		
15.02	Demonstrate proper use of the number systems.		
15.03	Develop effective operations on numbers and the relationships among these operations.		
15.04	Use estimation in problem solving and computation.		
15.05	Apply theories used in the solution to numbers.		
15.06	Use quantities in the real world and uses the measures to solve problems.		
15.07	Compare data within systems of measurement (both standard/nonstandard and metric/customary).		
15.08	Solve mathematical problems using length, time, weight/mass, temperature, money, perimeter, area, and volume, and estimate the effects of measurement errors on calculations.		
15.09	Apply appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.		
15.10	Describe, draw, Identify, and analyzes two-and three-dimensional shapes.		
15.11	Visualize and illustrate ways in which shapes can be combined, subdivided, and changed.		
15.12	Coordinate geometry to locate objects in both two and three dimensions and to describe objects algebraically.		
15.13	Describe, analyze, and generalize a wide variety of patterns, relations, and functions.		
15.14	Uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
15.15	Uses the tools of data analysis for managing information.		
15.16	Identify patterns and makes predictions from an orderly display of data using concepts of probability and statistics.		
15.17	Uses statistical methods to make inferences and valid arguments about real-world situations.		
16.0	Research content related to the project and document the results. – The student will be able to:		
16.01	Identify the basic research needed to develop the project plan.		
16.02	Identify available resources for completing background research required in the project plan.		
16.03	Demonstrate the ability to locate resource materials in a library, data base, internet and other research resources.		
16.04	Demonstrate the ability to organize information retrieval.		
16.05	Demonstrate the ability to prepare a topic outline.		
16.06	Write a draft of the research report.		
16.07	Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.		
16.08	Prepare an electronically composed research paper in proper form.		
16.09	Conduct an alpha and beta evaluation of the project's product.		
16.10	Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.		
17.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:		
17.01	Prepare a multi-media presentation on the completed project.		
17.02	Make an oral presentation, using multi-media materials.		
17.03	Review the presentation, and make changes in the delivery method(s) to improve presentation skills.		
18.0	Demonstrate competency in the area of expertise related to the Game, Simulation & Animation education program previously completed that this project is based upon. – The student will be able to:		
18.01	Demonstrate a mastery of the content of the selected subject area.		
18.02	Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
18.03	Demonstrate the ability to apply the knowledge, experience and skill developed in the previous program completion to the successful completion of this demonstration.		
18.04	Demonstrate the acquisition of additional knowledge, skill and experience in one area of the selected field of study beyond the performance standards of the initial program standards.		

Additional Information

Laboratory Activities

Laboratory investigations, including the use of scientific research, measurement, and laboratory technologies are an integral part of this course. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Florida Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Articulation

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Bright Futures/Gold Seal Scholarship

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx.

Fine Arts/Practical Arts Credit

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation (http://www.fldoe.org/articulation/CCD/files/pacourses1314.pdf). A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (http://www.fldoe.org/articulation/CCD/default.asp).

Florida Department of Education
Curriculum Framework

Program Title: **Geospatial/Geographic Information Systems (GIS) Technology**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	8600200
CIP Number	0545070214
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 TEC ED 1 @2 TEC EN AID @7 G *** See Note Below**
CTSO	Florida Technology Student Association (FL-TSA)
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

***Special Note**-- Any Vocational Coverage suitable for Secondary or PSAV implementation accompanied by industry-recognized GIS Technician certification in accordance with FS 1012.39*

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic benchmarks and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

This program is designed to prepare students for employment as a GIS Technology Assistant or a GIS Technician. Students are introduced to the concepts of Geospatial/Geographic Information System (GIS) and Remote Sensing (RS) Technology — an organized collection of computer hardware, specialized software, and geographic data designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced (spatial) information. Students will research and learn detailed information about global and local matters related to political, environmental, commercial, and other areas, through the use of specialized geospatial tools and products.

This program offers a broad foundation of core knowledge, transferable skills, and applications to prepare students for future careers as skilled GIS/RS professionals. As GIS is a rapidly developing field, GIS professionals are in high demand and this program will prepare students for entry into the field. The content of this program includes the development of the following computer skills and concepts: computer application skills (e.g., word processing, spreadsheet, presentation, and desktop publishing), Internet browser applications, computer programming, advanced web tools, and basic concepts of relational databases and the tools to use them. Additionally, this program stresses understanding and demonstration of GIS and RS concepts, project management strategies, applications of geographic data elements and remotely sensed data, visualizations of spatial data, data inventory management, demographic and economic data analysis, data collection methods and techniques, and extensive exploration of GIS/RS careers and job opportunities.

Additional Information relevant to this Career and Technical Education (CTE) program at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8600260 8600270	Introduction to GIS/RS Technology Essential GIS/RS Tools and Processes	1 credit 1 credit	15-1199	2	VO
B	8600280 8600290	GIS/RS Analysis and Modeling Advanced GIS/RS Applications	1 credit 1 credit	15-1199	2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8600260	3/87 3%	15/80 19%	5/83 6%	6/69 9%	9/67 13%	4/70 6%	4/69 6%	7/82 9%	4/66 6%	7/74 9%	9/72 13%
8600270	3/87 3%	5/80 6%	7/83 8%	3/69 4%	11/67 16%	9/70 13%	3/69 4%	8/82 10%	8/66 12%	4/74 5%	3/72 4%

8600280	22/87 25%	27/80 34%	2/83 2%	22/69 32%	8/67 12%	22/70 31%	24/69 35%	6/82 7%	20/66 30%	4/74 5%	24/72 33%
8600290	21/87 24%	21/80 26%	1/83 1%	21/69 30%	1/67 1%	22/70 31%	21/69 30%	2/82 2%	18/66 27%	2/74 3%	21/72 29%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8600260	15/67 22%	9/75 12%	14/54 26%	#	#	#	#
8600270	14/67 21%	8/75 11%	14/54 26%	#	#	#	#
8600280	9/67 13%	15/75 20%	8/54 15%	#	#	#	#
8600290	8/67 12%	14/75 19%	81/54 15%	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Program Implementation

This program emphasizes the development of abilities and/or awareness necessary to function in a highly technological society. The use of cooperative learning groups is recommended. By learning and practicing group process skills, students will be prepared to work "together" in real work situations. Program graduates will develop enhanced self-esteem as well as the problem-solving and teamwork skills necessary to succeed in careers and postsecondary education. Students will gain knowledge about career paths, have access to business role models, and have choices they would not otherwise have.

The Geospatial/Geographic Information Systems (GIS) Technology program places a strong emphasis on workplace learning. Shadowing and mentoring experiences with GIS professionals along with on-site trips to local businesses connect classroom learning to the workplace. In-class guest speakers bring the real world into the classroom.

Although a variety of GIS software applications and utilities are available in industry, the standards specified in this program focus on the underlying functions and associated competencies in alignment with the STARS program (www.digitalquest.com).

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.
04.0 Perform general computer application activities.
05.0 Understand the history, societal implications, underlying theories, and industry applications of GIS technology.
06.0 Understand map types, purposes, and information they depict.
07.0 Demonstrate an understanding of coordinate systems, projections, scale, multi-spectral imagery, and other concepts integral to geographic information systems.
08.0 Create, change, and manipulate data used to create a map.
09.0 Layout and print maps.
10.0 Design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals
11.0 Demonstrate language arts knowledge and skills.
12.0 Demonstrate mathematics knowledge and skills.
13.0 Demonstrate science knowledge and skills.
14.0 Customize the display of geospatial data.
15.0 Manage, query, and symbolize geospatial data.
16.0 Create a geospatial model.
17.0 Create, change, and manipulate remotely sensed image data.
18.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
19.0 Solve problems using critical thinking skills, creativity and innovation.
20.0 Use information technology tools.
21.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
22.0 Describe the importance of professional ethics and legal responsibilities.
23.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.
24.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.
25.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.
26.0 Create surface models of spatial data to map distance.
27.0 Demonstrate density models of spatial data.
28.0 Demonstrate different surface interpolation methods.
29.0 Demonstrate different surface analysis methods.
30.0 Use different statistical methods in raster analysis.
31.0 Interpret different types of spatial data used in 3D visualization and analysis.

32.0 Create network datasets using existing shapefiles and geodatabases.
33.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
34.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
35.0 Explain the importance of employability skill and entrepreneurship skills.
36.0 Demonstrate personal money-management concepts, procedures, and strategies.
37.0 Create a 3D map using a GPS unit for use in a class wide project.
38.0 Create an extensive campus-based geospatial project.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to GIS/RS Technology**
Course Number: **8600260**
Course Credit: **1**

Course Description:

While learning about the basics from the evolution of maps and projections, to learning about the modern uses of a geographic information system, students will complete many "hands-on" activities such as creating their own maps using compasses, rulers and tape measures. Specific areas of focus for this course include fundamental GIS and remote sensing concepts, project management strategies, and essential basic computer skills. Students will acquire a basic understanding of geographic terms and concepts necessary for the appropriate use of GIS, including concepts of spatial variables, scale, map projection, and map coordinate systems. Students will also be exposed to the history of GIS, how GIS fits into overall information management systems, and a variety of applications in which GIS can contribute to analysis and decision-making. They will also use a software application used to simulate satellite movements and utilize data, imagery, and GIS software to study their state, county, and school campus.

This hands-on course provides step by step instructions that will take you from learning the basics of these programs; like launching a map, viewing and editing metadata, to creating new shapefiles, and eventually to building a local map with data that you download from the Internet. While learning these valuable skills, students will be using the same geospatial tools that GIS Technicians in the industry are using.

Florida Standards				Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.			
	01.01	Key Ideas and Details		
		01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
		01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
		01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02	Craft and Structure		
		01.02.1	Determine the meaning of symbols, key terms, and other domain-specific	

Florida Standards			Correlation to CTE Program Standard #
		words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards			Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		

Florida Standards	Correlation to CTE Program Standard #
03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
04.0 Perform general computer application activities. – The student will be able to:	MAFS.912.N-Q.1.3; MAFS.912.S-IC.2	SC.912.N.1.1
04.01 Develop keyboarding skills to enter and manipulate text and data.		
04.02 Demonstrate basic computer file management skills.		
04.03 Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.		
04.04 Use spreadsheet, presentation software, and integrated software packages to enhance communication.		
04.05 Use computer networks (e.g., Internet, on-line databases) to facilitate collaborative or individual learning and communication.		
04.06 Use computers to access, retrieve, organize, process, maintain, interpret, and evaluate data and information.		
05.0 Understand the history, societal implications, underlying theories, and industry applications of GIS technology. – The student will be able to:		SC.912.N.2.2; 3.2; SC.912.E.5.7; 5.8; 5.9; SC.912.P.10.16; 10.17; 10.18; 10.19; SC.912.N.12.17; SC.912.P.10.20; 10.21; SC.912.E.5.10; 5.8; 5.9
05.01 Discuss the history and societal implications of mapping, GIS, and remote sensing.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	05.02 Describe the underlying theories of GIS and remote sensing technologies.		
	05.03 Identify industry applications for GIS technology.		
06.0	Understand map types, purposes, and information they depict. – The student will be able to:		SC.912.N.1.1; SC.912.E.5.10; 6.2; SC.912.L.14.53
	06.01 Compare and contrast various forms of maps in terms of purpose, information, and application.		
	06.02 Convert latitude and longitude information between DMS and DD forms.		
	06.03 Identify sources of GIS information and their applicability to GIS projects.		
	06.04 Demonstrate how to read a topographical map.		
	06.05 Identify different types of maps.		
	06.06 List the major elements of maps.		
	06.07 Calculate straight line distances on the earth from latitudes and longitudes.		
07.0	Demonstrate an understanding of coordinate systems, projections, scale, multi-spectral imagery, and other concepts integral to geographic information systems. – The student will be able to:		SC.912.N.1.1; SC.912.E.5.10
	07.01 Identify terminology associated with map coordinate systems and location.		
	07.02 Interpret location using the Geographic Coordinate System to identify absolute location.		
	07.03 Identify terminology associated with maps, map scale, map projections, and orienteering.		
	07.04 Explain the Universe Transverse Mercator (UTM) coordinate system.		
	07.05 Interpret locations using the UTM coordinate system.		
	07.06 Demonstrate an understanding of how maps are created using aerial photography.		
	07.07 Explain the State Plane Coordinate System (SPC)		
	07.08 Interpret locations using the SPC system.		
	07.09 Convert data from UTM to SPC and from SPC to UTM.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
08.0	Create, change, and manipulate data used to create a map. – The student will be able to:	MAFS.912.N-Q.1.3; MAFS.912.S-IC.2	SC.912.N.1.1; 1.2; SC.912.P.12.9.
08.01	Identify the primary components of the GIS Project Management Model.		
08.02	Utilize a GPS unit to collect waypoints, measure distance, and calculate area.		
08.03	Create and customize a localized satellite map scenario using an appropriate GIS software application.		
08.04	Demonstrate the use of zooming, identifying, bookmarks, selecting, and panning tools.		
08.05	Explain the components of the map display and the tools in the tool bars of common mapping software.		
08.06	Explain the need for and uses of metadata.		
08.07	Demonstrate geocoding addresses, heads-up digitizing, editing symbols, clipping data layers, and creating buffers.		
08.08	Demonstrate various styles of displaying symbols of data, sorting querying, and selection techniques.		
08.09	Demonstrate editing feature data.		
08.10	Explain spatial reference.		
08.11	Demonstrate how to georeference an Image Data Layer and add Control Points.		
09.0	Layout and print maps. – The student will be able to:		SC.912.N.1.1
09.01	Demonstrate the ability to define page margins and parameters for printing a specific size.		
09.02	Demonstrate effective use of map elements that must be included in a map including title, author, data, legend, scale bar, north arrow.		
09.03	Demonstrate effective use of page space through map scale and frame size.		
09.04	Demonstrate process of creating digital archives of maps utilizing the export command.		
10.0	Design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals. – The student will be able to:		SC.912.N.1.1; SC.912.L.17.13; 17.20
10.01	Research, compare, and contrast GIS technology careers (e.g., characteristics needed, skills required, education required, industry certifications, advantages and disadvantages of GIS technology careers, the need for GIS technology workers).		
10.02	Describe the variety of occupations and professions within the world of GIS technology including those where information technology is either in a primary focus or in a supportive role.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
10.03	Describe job requirements for the variety of occupations and professions within the global world of GIS technology.		
10.04	Analyze personal skills and aptitudes in comparison with GIS technology career opportunities.		
10.05	Refine and implement a plan to facilitate personal growth and skill development related to GIS technology career opportunities.		
10.06	Develop and maintain an electronic career portfolio, to include, but not limited to the Resume and Letter of Application.		
11.0	Demonstrate language arts knowledge and skills. – The student will be able to:		
11.01	Locate, comprehend and evaluate key elements of oral and written information.		
11.02	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
11.03	Present information formally and informally for specific purposes and audiences.		
11.04	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
11.05	Present information formally and informally for specific purposes and audiences.		
12.0	Demonstrate mathematics knowledge and skills. – The student will be able to:		
12.01	Demonstrate knowledge of arithmetic operations.		
12.02	Analyze and apply data and measurements to solve problems and interpret documents.		
12.03	Construct charts/tables/graphs using functions and data.		
13.0	Demonstrate science knowledge and skills. – The student will be able to:		
13.01	Discuss the role of creativity in constructing scientific questions, methods and explanations.		
13.02	Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.		
13.03	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
13.04	Present information formally and informally for specific purposes and audiences.		

Florida Department of Education
Student Performance Standards

Course Title: **Essential GIS/RS Tools and Processes**
Course Number: **8600270**
Course Credit: **1**

Course Description:

Students in this course will use their knowledge of mapping and cataloging to complete numerous geospatial applications. They will learn techniques in displaying, managing, querying, symbolizing, and create geospatial data. Students will learn the skills required to work on and/or build advanced GIS/RS projects.

Students will follow a course of hands-on instruction to learn advanced skills ranging from introductory spatial analysis to examining spatial relationships within a specified area. Additionally, they will study site suitability to using three-dimensional generating software to gain a different perspective of their environment by modeling surfaces. Students will use scenarios to map features and study relationships that exist in their local community.

Students will use remote sensing applications and data to develop skills that will allow them to take images and convert them to data that they will use for different types of analyses. The types of analyses will include using data in image analysis, feature extraction, vegetation mapping and change detection, and image enhancement.

Florida Standards				Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.			
	01.01	Key Ideas and Details		
		01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
		01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
		01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02	Craft and Structure		
		01.02.1	Determine the meaning of symbols, key terms, and other domain-specific	

Florida Standards			Correlation to CTE Program Standard #
		words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards			Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		

Florida Standards	Correlation to CTE Program Standard #
03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04 Model with mathematics. MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
14.0 Customize the display of geospatial data. – The student will be able to:		SC.912.N.1.1; SC.912.E.5.10; 6.6;
14.01 Edit Layer Properties.		
14.02 Create Layer Files.		
14.03 Edit an attribute table by adding a new field with calculating values.		
14.04 Perform relates and joins with data tables.		
15.0 Manage, query, and symbolize geospatial data. – The student will be able to:	MAFS.912.N-Q.1.3	SC.912.E.6.2; 6.3; 6.4; 6.5; 6.6; 7.1; 7.2; 7.8; 17.2
15.01 Label features.		
15.02 Insert, copy, and paste data into new data frames.		
15.03 Create graphs and reports from data.		
15.04 Demonstrate how to analyze land use, population, and flood zone data.		
15.05 Create geospatial data.		
15.06 Symbolize a raster layer.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	15.07 Resolve unmatched addresses while geocoding addresses.		
	15.08 Use dissolve features, hyperlink, spatially join data, and create buffer functions.		
16.0	Create a geospatial model. – The student will be able to:		SC.912.N.1.1; SC.912.L.17.13; 17.20
	16.01 Create a geodatabase, import existing feature classes into a geodatabase, and import multiple feature classes to a geodatabase.		
	16.02 Plan and build a local data inventory.		
17.0	Create, change, and manipulate remotely sensed image data. – The student will be able to:		SC.912.N.1.1; SC.912.P.10.18; SC.912.E.6.4; SC.912.L.17.1; 17.3; 17.7; 14.53; SC.912.E.7.4; SC.912.E.6.2; 6.3; SC.912.L.17.4; SC.912.E.6.6; SC.912.L.16.10; SC.912.P.10.17; 10.18
	17.01 View single band and multispectral images.		
	17.02 Perform various manipulations to an image including creating a subset of an image, mosaic two georeferenced images, and orthorectification.		
	17.03 Perform image analysis by orthorectifying non-georeferenced digital images to existing map features.		
	17.04 Use various tools in image analysis to extract land features from imagery data.		
	17.05 Categorize land cover types using image analysis tools.		
	17.06 Conduct vegetation analysis on imagery using image analysis tools.		
	17.07 Evaluate areas of change in images.		
	17.08 Enhance an image by adjusting the brightness and contrast, adjusting the histogram, applying custom histogram stretches, sharpening and smoothing its appearance.		
	17.09 Convert an image from color IR to natural color by performing a resolution merge.		
18.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
	18.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	18.02 Locate, organize and reference written information from various sources.		
	18.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.		
	18.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.		
	18.05 Apply active listening skills to obtain and clarify information.		
	18.06 Develop and interpret tables and charts to support written and oral communications.		
	18.07 Exhibit public relations skills that aid in achieving customer satisfaction.		
19.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	19.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.		
	19.02 Employ critical thinking and interpersonal skills to resolve conflicts.		
	19.03 Identify and document workplace performance goals and monitor progress toward those goals.		
	19.04 Conduct technical research to gather information necessary for decision-making.		
20.0	Use information technology tools. – The student will be able to:		
	20.01 Use personal information management (PIM) applications to increase workplace efficiency.		
	20.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
	20.03 Employ computer operations applications to access, create, manage, integrate, and store information.		
	20.04 Employ collaborative/groupware applications to facilitate group work.		
21.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
	21.01 Describe the nature and types of business organizations.		
	21.02 Explain the effect of key organizational systems on performance and quality.		
	21.03 List and describe quality control systems and/or practices common to the workplace.		
	21.04 Explain the impact of the global economy on business organizations.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
22.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
22.01	Evaluate and justify decisions based on ethical reasoning.		
22.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		
22.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.		
22.04	Interpret and explain written organizational policies and procedures.		

Florida Department of Education
Student Performance Standards

Course Title: **GIS/RS Analysis and Modeling**
Course Number: **8600280**
Course Credit: **1**

Course Description:

This course covers Surface Analysis, 3D modeling, and working with street networks.

This course directs students through five types of applications in Surface Analysis. It focuses on the various methods and uses of displaying continuous, or grid, data over a surface. Students will be expected to map data such as elevation, rainfall and temperature – data that differs from one location to the next on the surface of the earth. The five types of analyses used in this course are: mapping distance, density, interpolation, surface analysis, and statistics. This course will conclude with a short project where student will use their newly acquired skills to perform surface analysis tasks to their local area.

There is a strong emphasis on students viewing their local area and the world in three dimensions. Students will learn skills such as viewing and displaying data, acquiring and processing data from online resources, displaying non-elevation data in 3D, applying surface analysis to 3D, adding raster and vector data, animating data, and exporting projects.

Students will also explore in greater depth data layers previously studied in order to analyze the flow or navigation of networked data. They will also delve into the specifics of network analysis and examine how problems dealing with geospatial networks and routing may be found in the business world and in communities. The five types of network analyses covered in this course include Exploring Geospatial Networks, Finding the Best Route, Finding the Closest Facility, Determining Service Areas, and Modeling Real World Traffic Flow.

Florida Standards			Correlation to CTE Program Standard #
23.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
	23.01 Key Ideas and Details		
	23.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	23.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	23.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.1.3	
23.02	Craft and Structure		
	23.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	23.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	23.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
23.03	Integration of Knowledge and Ideas		
	23.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	23.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	23.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
23.04	Range of Reading and Level of Text Complexity		
	23.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	23.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
24.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
24.01	Text Types and Purposes		
	24.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	24.01.2	Write informative/explanatory texts, including the narration of historical	

Florida Standards			Correlation to CTE Program Standard #
		events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
24.02	Production and Distribution of Writing		
	24.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	24.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	24.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
24.03	Research to Build and Present Knowledge		
	24.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	24.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	24.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
24.04	Range of Writing		
	24.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
25.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
25.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		

Florida Standards	Correlation to CTE Program Standard #
25.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
25.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
25.04 Model with mathematics. MAFS.K12.MP.4.1	
25.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
25.06 Attend to precision. MAFS.K12.MP.6.1	
25.07 Look for and make use of structure. MAFS.K12.MP.7.1	
25.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
26.0 Create surface models of spatial data to map distance. – The student will be able to:		SC.912.E.5.11; SC.912.N.3.5; SC.912.P.12.1; 12.9
26.01 Create a straight line distance calculation.		
26.02 Create a cost weighted distance calculation based on multiple inputs (costs).		
26.03 Analyze an allocation grid created from a distance analysis calculation.		
27.0 Demonstrate density models of spatial data. – The student will be able to:	MAFS.912.N-Q.1.3; MAFS.912.S-IC.2	SC.912.N.3.5; SC.912.P.12.9
27.01 Identify different distance density calculation techniques.		
27.02 Calculate density using both the kernel and simple calculation methods.		
28.0 Demonstrate different surface interpolation methods. – The student will be able to:	MAFS.912.N-Q.1.3; MAFS.912.S-IC.2	SC.912.N.1.1; SC.912.E. 6.2; 7.3; 7.4
28.01 Create a surface from a set of features using the Inverse Distance Weighted interpolation method.		
28.02 Create a surface from a set of features using the Spline interpolation method.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	28.03 Create a surface from a set of features using the Kriging interpolation method.		
29.0	Demonstrate different surface analysis methods. – The student will be able to:		SC.912.E.6.3; SC.912.P.12.1; SC.912.E.12.9
	29.01 Create elevation contour data from an elevation raster.		
	29.02 Calculate and display slope derived from an elevation raster.		
	29.03 Determine and display aspect from an elevation raster.		
	29.04 Create a hillshade surface from an elevation raster.		
	29.05 Calculate the viewshed of a surface to determine visible objects.		
	29.06 Calculate the cut/fill of a surface to estimate volume changes.		
30.0	Use different statistical methods in raster analysis. – The student will be able to:	MAFS.912.N-Q.1.3; MAFS.912.S-IC.2	SC.912.P.12.9; SC.912.N.4.2; SC.912.L.17.1
	30.01 Calculate cell statistics using temporal raster grid data.		
	30.02 Calculate neighborhood statistics and zonal statistics using raster grid data.		
31.0	Interpret different types of spatial data used in 3D visualization and analysis. – The student will be able to:		SC.912.P.12.9
	31.01 Navigate various types of surfaces.		
	31.02 Explore methods of obtaining, downloading, and extracting free data using the Internet.		
	31.03 Build 3D datasets.		
	31.04 Display 2D features onto a 3D surface.		
	31.05 Create shapefiles to view in a 3D environment.		
	31.06 Construct a 3D model of an urban environment.		
	31.07 Display georeferenced data measurements in 3D.		
	31.08 Apply Interpolation methods.		
	31.09 Utilize georeferenced 2D data in a 3D environment to provide valuable information.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	31.10 Create contour lines in a 3D environment.		
	31.11 Search, select, and download public domain data and imagery from the Nation Elevation Dataset (NED).		
32.0	Create network datasets using existing shapefiles and geodatabases. – The student will be able to:		
	32.01 Find the most efficient routes for multiple stops on a complex street network.		
	32.02 Generate directions from one location to another using a street network.		
	32.03 Find the closest facility from a location on a complex street network.		
	32.04 Define service areas using a street network based on travel time.		
	32.05 Create an Origin-Destination Cost Matrix to communicate costs associated with travel from facilities to destinations in a geospatial network.		
	32.06 Demonstrate modeling of real world traffic flow.		
	32.07 Create a 3D map using a GPS unit for use in a class wide project.		
33.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
	33.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		
	33.02 Explain emergency procedures to follow in response to workplace accidents.		
	33.03 Create a disaster and/or emergency response plan.		
34.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives – The student will be able to:		
	34.01 Employ leadership skills to accomplish organizational goals and objectives.		
	34.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
	34.03 Conduct and participate in meetings to accomplish work tasks.		
	34.04 Employ mentoring skills to inspire and teach others.		
35.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
	35.01 Identify and demonstrate positive work behaviors needed to be employable.		
	35.02 Develop personal career plan that includes goals, objectives, and strategies.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	35.03 Examine licensing, certification, and industry credentialing requirements.		
	35.04 Maintain a career portfolio to document knowledge, skills, and experience.		
	35.05 Evaluate and compare employment opportunities that match career goals.		
	35.06 Identify and exhibit traits for retaining employment.		
	35.07 Identify opportunities and research requirements for career advancement.		
	35.08 Research the benefits of ongoing professional development.		
	35.09 Examine and describe entrepreneurship opportunities as a career planning option.		
36.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:		
	36.01 Identify and describe the services and legal responsibilities of financial institutions.		
	36.02 Describe the effect of money management on personal and career goals.		
	36.03 Develop a personal budget and financial goals.		
	36.04 Complete financial instruments for making deposits and withdrawals.		
	36.05 Maintain financial records.		
	36.06 Read and reconcile financial statements.		
	36.07 Research, compare and contrast investment opportunities.		

Florida Department of Education
Student Performance Standards

Course Title: **Advanced GIS/RS Applications**
Course Number: **8600290**
Course Credit: **1**

Course Description:

This project-based, capstone course challenges students to apply all skills and techniques learned in the previous three courses to create their first extensive GIS and Remote Sensing project. In this project, students will work in teams to create a three-dimensional map of their campus using GIS and RS tools. Once the base map is completed, each student selects one of the designated campus-based projects to complete. Students will be involved with all parts of the process including problem identification, data collection using GPS units, determining the appropriate type of analysis to be conducted or type of product to address the problem statement, performing the analysis, create their solution, and formally presenting the project to interested stakeholders. Each project integrates project planning, geographic problem solving, GIS/RS tools and software applications, project management, data creation, data manipulation, data analysis, report, and presentations.

Florida Standards			Correlation to CTE Program Standard #
23.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
23.01	Key Ideas and Details		
23.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
23.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
23.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
23.02	Craft and Structure		
23.02.1		Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
23.02.2		Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.5	
	23.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
23.03	Integration of Knowledge and Ideas		
	23.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	23.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	23.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
23.04	Range of Reading and Level of Text Complexity		
	23.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	23.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
24.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
24.01	Text Types and Purposes		
	24.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	24.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
24.02	Production and Distribution of Writing		
	24.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	24.02.2	Develop and strengthen writing as needed by planning, revising, editing,	

Florida Standards			Correlation to CTE Program Standard #
		rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	24.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
24.03	Research to Build and Present Knowledge		
	24.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	24.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	24.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
24.04	Range of Writing		
	24.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
25.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Geospatial/Geographic Information Systems (GIS) Technology.		
25.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
25.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
25.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
25.04	Model with mathematics. MAFS.K12.MP.4.1		
25.05	Use appropriate tools strategically.		

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.5.1	
25.06 Attend to precision. MAFS.K12.MP.6.1	
25.07 Look for and make use of structure. MAFS.K12.MP.7.1	
25.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
37.0 Create a 3D map using a GPS unit for use in a class wide project.		
38.0 Create an extensive campus-based geospatial project. – The student will be able to:		SC.912.N.1.1, 1.2; SC.912.L.17.1; SC.912.L.17.18
38.01 Create a campus inventory.		
38.02 Plan a complete geospatial project.		
38.03 Implement a campus-based geospatial project.		
38.04 Organize project into an effective report including map layouts.		
38.05 Present project using a written and/or oral report.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Course Title: **Information Technology Directed Study**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Course Number	9000100
CIP Number	0511999901
Grade Level	11-12, 30, 31
Standard Length	1 credit – Multiple credits
Teacher Certification	BUS ED 1 @2 INFO TECH 7G WEB DEV 7G COMP PROG 7G COMPU SCI 6 CYBER TECH 7G DIGI MEDIA 7G
CTSO	FBLA BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to provide students with learning opportunities in a prescribed program of study within the Information Technology cluster that will enhance opportunities for employment in the career field chosen by the student.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The content is prescribed by the instructor based upon the individual student's assessed needs for directed study.

This course may be taken only by a student who has completed or is currently completing a specific secondary job preparatory program or occupational completion point for additional study in this career cluster. A student may earn multiple credits in this course.

The selected standards and benchmarks, which the student must master to earn credit, must be outlined in an instructional plan developed by the instructor.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate expertise in a specific occupation contained within the career cluster.
02.0 Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare presentation to defend results.
03.0 Apply enhanced leadership and professional career skills.
04.0 Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study.

Florida Department of Education
Student Performance Standards

Course Title: **Information Technology Directed Study**
Course Number: **9000100**
Course Credit: **1**

CTE Standards and Benchmarks	
01.0	Demonstrate expertise in a specific occupation within the career cluster. – The student will be able to:
01.01	The benchmarks will be selected from the appropriate curriculum frameworks and determined by the instructor based upon the individual students assessed needs.
02.0	Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare presentation to defend results. – The student will be able to:
02.01	Select investigative study referencing prior research and knowledge.
02.02	Collect, organize and analyze data accurately and precisely.
02.03	Design procedures to test the research.
02.04	Report, display and defend the results of investigations to audiences that may include professionals and technical experts.
03.0	Apply enhanced leadership and professional career skills. – The student will be able to:
03.01	Develop and present a professional presentation offering potential solutions to a current issue.
03.02	Enhance leadership and career skills through work-based learning including job placement, job shadowing, entrepreneurship, internship, or a virtual experience.
03.03	Participate in leadership development opportunities available through the appropriate student organization and/or other professional organizations.
03.04	Enhance written and oral communications through the development of presentations, public speaking, and live and/or virtual interviews.

04.0 Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study. – The student will be able to:
04.01 Use mathematical and/or scientific skills to solve problems encountered in the chosen occupation.
04.02 Read and interpret information relative to the chosen occupation.
04.03 Locate and evaluate key elements of oral and written information.
04.04 Analyze and apply data and/or measurements to solve problems and interpret documents.
04.05 Construct charts/tables/graphs using functions and data.

Additional Information

Laboratory Activities

A learning laboratory is provided as required to support the educational activities of the student. This laboratory may be in the traditional classroom, in an industry setting, or a virtual learning environment.

Special Notes

The **Cooperative Education Manual** is available on-line and has guidelines for students, teachers, employers, parents and other administrators and sample training agreements. It can be accessed on the DOE Website at http://www.fldoe.org/core/fileparse.php/3/urlt/steps-manual.pdf.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the appropriate career and technical student organizations for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities may need additional time (beyond the regular school year) to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Course Title: **Information Technology Cooperative Education – OJT**
Course Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Cooperative Education – OJT	
Course Number	9000420
CIP Number	05119999CP
Grade Level	9-12, 30, 31
Standard Length	Multiple credits
Teacher Certification	BUS ED 1 @2 INFO TECH 7G WEB DEV 7G COMP PROG 7G CYBER TECH 7G DIGI MEDIA 7G
CTSO	FBLA BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology cluster.

Each student job placement must be related to the job preparatory program in which the student is enrolled or has completed.

The purpose of this course is to provide the on-the-job training component when the **cooperative method of instruction** is appropriate. Whenever the cooperative method is offered, the following is required for each student: a training agreement; a training plan signed by the student, teacher and employer, including instructional objectives; a list of on-the-job and in-school learning experiences; a workstation which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal; and a site supervisor with a working knowledge of the selected occupation. The workstation may be in an industry setting or in a virtual learning environment. The student **must be compensated** for work performed.

The teacher/coordinator must meet with the site supervisor a minimum of once during each grading period for the purpose of evaluating the student's progress in attaining the competencies listed in the training plan.

Information Technology Cooperative Education – OJT may be taken by a student for one or more semesters. A student may earn multiple credits in this course. The specific student performance standards which the student must achieve to earn credit are specified in the Cooperative Education – OJT Training Plan.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform designated job skills.
02.0 Demonstrate work ethics.

Florida Department of Education
Student Performance Standards

Program Title: **Information Technology Cooperative Education – OJT**
Secondary Number: **9000420**

Standards and Benchmarks
01.0 Perform designated job skills. – The student will be able to:
01.01 Perform tasks as outlined in the training plan.
01.02 Demonstrate job performance skills.
01.03 Demonstrate safety procedures on the job.
01.04 Maintain appropriate records.
01.05 Attain an acceptable level of productivity.
01.06 Demonstrate appropriate dress and grooming habits.
02.0 Demonstrate work ethics. – The student will be able to:
02.01 Follow directions.
02.02 Demonstrate good human relations skills on the job.
02.03 Demonstrate good work habits.
02.04 Demonstrate acceptable business ethics.

Additional Information

Special Notes

The **Cooperative Education Manual** is available on-line and has guidelines for students, teachers, employers, parents and other administrators and sample training agreements. It can be accessed on the DOE Website at http://www.fldoe.org/core/fileparse.php/3/urlt/steps-manual.pdf.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities may need additional time (beyond the regular school year) to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Web Development**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9001100
CIP Number	0511080100
Grade Level	9-12, 30, 31
Standard Length	7 credits
Teacher Certification	BUS ED 1 @2 VOE @7 TC COOP ED @7 BUS DP @7 %G ELECT DP @7 %G CLERICAL @7 7G SECRETAR 7G STENOG @4 TEC ELEC $7 G COMP SCI 6 COMM ART @7 7G WEB DEV 7 G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as an Assistant Web Designer, a Web Designer, and Senior Web Designer in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to operating system commands and web document development, design, promotion and scripting.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of Digital Information Technology and three additional occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8207310	Digital Information Technology	1 credit	15-1199	2	PA
B	9001110 9001120	Foundations of Web Design User Interface Design	1 credit 1 credit	15-1199	3 3	PA
C	9001130 9001140	Web Scripting Fundamentals Media Integration Essentials	1 credit 1 credit	15-1199	3 3	VO
D	9001150 9001160	E-commerce & Marketing Essentials Interactivity Essentials	1 credit 1 credit	15-1199	3 3	VO PA

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1	Environmental Science
8207310	15/87 17%	22/80 28%	14/83 17%	20/69 29%	12/67 18%	15/69 22%	12/82 15%	23/66 35%	16/74 22%	18/72 25%	23/70 33%
9001110	3/87 3%	2/80 3%	2/83 2%	2/69 3%	1/67 1%	3/69 4%	1/82 1%	3/66 5%	1/74 1%	2/72 3%	3/70 4%
9001120	21/87 24%	22/80 28%	4/83 5%	21/69 330%	2/67 3%	21/69 30%	3/82 4%	18/66 27%	3/74 4%	20/72 28%	23/70 33%
9001130	19/87 22%	19/80 24%	0/83 0%	19/69 28%	0/67 0%	19/69 28%	0/82 0%	14/66 21%	0/74 0%	19/72 26%	19/70 27%
9001140	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%	0/70 0%
9001150	2/87 2%	3/80 4%	2/83 2%	1/69 1%	1/67 1%	2/69 3%	2/82 2%	3/66 5%	2/74 3%	1/72 1%	2/70 10%
9001160	0/87 0%	1/80 1%	1/83 1%	0/69 0%	0/67 0%	0/69 0%	1/82 1%	1/66 2%	1/74 1%	0/72 0%	1/70 1%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	40/45 0%
9001110	16/67 24%	11/75 15%	15/54 28%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9001120	8/67 12%	14/75 19%	9/54 17%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9001130	10/67 15%	17/75 23%	8/54 15%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9001140	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9001150	6/67 9%	5/75 7%	2/54 4%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9001160	0/67 0%	1/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards (NGSSS) for Science. These standards are listed next to the content standards.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida State Standards for grades 09-10 reading in Technical Subjects for student success in Web Development.
02.0 Methods and strategies for using Florida State Standards for grades 09-10 writing in Technical Subjects for student success in Web Development.
03.0 Methods and strategies for using Florida State Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Web Development.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Demonstrate proficiency in website planning and the design process.
19.0 Develop markup language structures.
20.0 Create basic web pages.
21.0 Incorporate images and graphical formatting on a webpage.
22.0 Create a basic table structure.
23.0 Incorporate form structures in a webpage.
24.0 Describe frame structures and their usage.
25.0 Use Cascading Style Sheets (CSS).
26.0 Examine web design technologies and techniques.
27.0 Describe the process for publishing a website.
28.0 Describe how website performance is monitored and analyzed.
29.0 Create an informational website.

30.0 Demonstrate language arts knowledge and skills.
31.0 Demonstrate mathematics knowledge and skills.
32.0 Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Development.
33.0 Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Development.
34.0 Methods and strategies for using Florida State Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Web Development.
35.0 Incorporate Human Computer Interface (HCI) principles of design.
36.0 Research and obtain information for use in designing the user interface.
37.0 Create an intuitive interface using Cascading Style Sheets (CSS).
38.0 Demonstrate proficiency creating a logical website file structure.
39.0 Create a CSS formatted informational website.
40.0 Demonstrate proficiency publishing, testing, monitoring, and maintaining a website.
41.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
42.0 Solve problems using critical thinking skills, creativity and innovation.
43.0 Use information technology tools.
44.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
45.0 Describe the importance of professional ethics and legal responsibilities.
46.0 Discuss the differences between server-side and client-side scripting.
47.0 Compare and contrast client-side scripting languages (JavaScript, VBScript, and ECMAScript).
48.0 Demonstrate understanding of the Document Object Model (DOM).
49.0 Design, write, debug, and incorporate a JavaScript client-side script into a webpage.
50.0 Incorporate basic JavaScript form validation and form handling (using pre-built validation scripts or online libraries).
51.0 Use advanced JavaScript techniques.
52.0 Demonstrate understanding of JavaScript accessibility issues.
53.0 Select and modify appropriate library and pre-built JavaScript to incorporate into webpage.
54.0 Incorporate graphics, animations, and video assets into a webpage design using conventional HTML techniques.
55.0 Demonstrate understanding of XML vocabularies and documents.
56.0 Create and debug an XML Document.
57.0 Create and debug compound documents with Namespaces.
58.0 Demonstrate ability to validate documents with a Data Type Definition (DTD).
59.0 Demonstrate ability to validate documents with XML Schema.
60.0 Demonstrate an understanding of Asynchronous JavaScript and XML (AJAX) and its implications for web developers.
61.0 Plan and implement a multi-page website that features graphics, pictures, and video galleries using AJAX techniques.
62.0 Demonstrate knowledge and skills necessary to setup a secure E-commerce site.
63.0 Identify security issues associated with E-commerce and discuss methods to mitigate risks.
64.0 Apply skills necessary to setup an E-commerce storefront.
65.0 Employ techniques to enhance the value and profitability of an E-commerce website.
66.0 Develop an evaluation and performance monitoring framework featuring established metrics and target goals for an E-commerce website.
67.0 Demonstrate an understanding of Content Management Systems (CMS) and their implications for web development.
68.0 Use CMS features, functions, and extensions/modules to create/enhance a website.

69.0 Evaluate the suitability for and system requirements for a content management system.
70.0 Demonstrate an understanding of multimedia applications and their implications for web designers.
71.0 Create and incorporate interactive website components.
72.0 PDF document usage considerations.
73.0 Create, format, and manipulate PDF documents.
74.0 Display, distribution, and print considerations for PDF documents.
75.0 Create and manage PDF forms.
76.0 Incorporate PDF security in a PDF document.
77.0 Demonstrate proficiency using HTML5 features and functions.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Foundations of Web Design**
Course Number: **9001110**
Course Credit: **1**

Course Description:

This course is designed to provide students with opportunities to acquire and apply foundational skills related to web design.

Florida State Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida State Standards for grades 09-10 reading in Technical Subjects for student success in Web Development.		
	01.01 Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02 Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
	01.03 Integration of Knowledge and Ideas		

Florida State Standards			Correlation to CTE Program Standard #
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
	01.04 Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida State Standards for grades 09-10 writing in Technical Subjects for student success in Web Development.		
	02.01 Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.02 Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	

Florida State Standards			Correlation to CTE Program Standard #
		LAFS.910.WHST.2.6	
	02.03 Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04 Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida State Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Web Development.		
	03.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
	03.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
	03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
	03.04 Model with mathematics. MAFS.K12.MP.4.1		
	03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1		
	03.06 Attend to precision. MAFS.K12.MP.6.1		
	03.07 Look for and make use of structure. MAFS.K12.MP.7.1		
	03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
18.0	Demonstrate proficiency in website planning and the design process. – The student will be able to:		
18.01	Define information architecture.		
18.02	Discuss the importance of information architecture to web design and development.		
18.03	Conduct a client interview to determine the business purpose and needs.		
18.04	Conduct a competitive analysis.		
18.05	Identify stages in the web design process and describe the activities comprising each stage.		
18.06	Define the site structure by creating a content map, storyboard, and associated wireframes.	MAFS.912.G-MG.1.3	
18.07	Create a global site map.		
18.08	Discuss the legal and ethical issues related to web design.		SC.912.L.16.10
18.09	Describe accessibility and its implications on web design.		
18.10	Create a web site mock-up for client approval.		
19.0	Develop markup language structures. – The student will be able to:		
19.01	Define common markup languages and their usage.		
19.02	Examine emerging and new markup languages.		
19.03	Determine browser support and appropriate usage of markup languages (existing and emerging).		
19.04	Identify common DOCTYPES (e.g., Strict, Transitional and Frameset) and describe their appropriate use.		
20.0	Create basic webpages. – The student will be able to:		
20.01	Create basic webpage structures using common markup elements and attributes.		
20.02	Incorporate list structures in a webpage (i.e., ordered, unordered, definition, nested).		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
20.03 Incorporate link structures in a webpage (i.e., external, internal, email).		
20.04 Research and incorporate web color usage principles in a webpage.		
21.0 Incorporate images and graphical formatting on a webpage. – The student will be able to:		
21.01 Describe usage guidelines (e.g., format types, size, relevance) for integrating images and graphics onto a webpage.		
21.02 Compare and contrast standard image formats used in webpage design.	MAFS.912.S-CP.1.1	
21.03 Incorporate graphics into a webpage design.		
21.04 Create and incorporate image maps in a webpage.		
21.05 Optimize images and graphics for use in a webpage.		
22.0 Create a basic table structure. – The student will be able to:		
22.01 Describe how tables are used in web design.		SC.912.N.1.1
22.02 Discuss the advantages and disadvantages of incorporating tables in a webpage design.		SC.912.N.1.1
22.03 Define and modify table structures for the presentation of tabular information.	MAFS.912.G-MG.1.3	SC.912.N.1.1
22.04 Create accessible tables using standard table elements and attributes.		SC.912.N.1.1
23.0 Incorporate form structures in a webpage. – The student will be able to:		
23.01 Create an accessible form using common elements, including form, fieldset, legend, textarea, select, option, button, and input (radio, checkbox, submit, reset, image, password, hidden).		
23.02 Describe and diagram the relationship between XHTML forms and server-side technologies.		
23.03 Compare and contrast the GET and POST methods for forms handling.		
23.04 Define form validation and describe how it is accomplished.		
23.05 List popular server-side technologies often used to process content sent from XHTML forms.		
23.06 Use labels with form elements.		
23.07 Connect a XHTML form to a server-side script for processing.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
24.0	Describe frame structures and their usage. – The student will be able to:		
24.01	Explore frame and iframe structures and support issues.		
24.02	Describe appropriate uses of iframes.		
24.03	Incorporate frame structure in a webpage.		
25.0	Use Cascading Style Sheets (CSS). – The student will be able to:		
25.01	Define CSS and describe its importance in web design.		
25.02	Compare and contrast existing and emerging CSS versions.		
25.03	Determine browser support and appropriate usage of CSS (existing and emerging versions).		
25.04	Explain "document flow" and describe its implications on web design.		
25.05	Recognize and use element selectors, ID selectors, class selectors, pseudo-class selectors, and descendant selectors.		
25.06	Explain how inheritance and specificity affect CSS rule conflicts.		
25.07	Use inline styles, embedded style sheets, and external style sheets.		
25.08	Use the link and import methods to connect to an external style sheet.		
25.09	Use CSS shorthand techniques to create efficient and concise style sheets.		
25.10	Apply basic CSS properties (background, border, clear, color, float, font, height, line-height, list-style, margin, overflow, padding, position, text-align, text-indent, width, z-index, padding).		
25.11	Use CSS to style tables (e.g., borders, width, spacing, alignment, background).	MAFS.912.G-MG.1.3	
25.12	Use CSS to enhance the appearance and usability of an XHTML form.		
26.0	Examine web design technologies and techniques. – The student will be able to:		
26.01	Compare and contrast common authoring tools.		
26.02	Compare and contrast client-side and server-side technologies.		
26.03	Define e-commerce types and usage.		
26.04	Describe database connectivity relative to websites.		
26.05	Identify technologies to enhance user experience.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
27.0	Describe the process for publishing a website. – The student will be able to:		
27.01	Explore domain name selection principles.		
27.02	Identify process to registering a domain name.		
27.03	Compare and contrast hosting providers, features, and selection criteria.	MAFS.912.S-CP.1.1	
27.04	Describe the various means for uploading website files (e.g., FTP, web-based tools).		
28.0	Describe how website performance is monitored and analyzed. – The student will be able to:		
28.01	Identify issues related to website maintenance.		
28.02	Use webpage validation tools.		SC.912.N.1.1
28.03	Describe website performance metrics (e.g., visits, time-on-page, time-on-site) and discuss their design implications.		
28.04	Demonstrate knowledge of accessibility problems and solutions.		
28.05	Examine indexing, page ranking, basic Search Engine Optimization techniques.		
28.06	Explore common website analytic tools.		
29.0	Create an informational website. – The student will be able to:		
29.01	Use GUI (Graphical User Interface) web authoring software to create a multi-page informational website.		
29.02	Use image-editing software to enhance website designs with simple graphics.		
29.03	Use animation software to enhance website designs.		
29.04	Enhance the website using client-side technologies (rollovers, check plug-ins, pop-up windows).		
29.05	Demonstrate efficient, consistent web site development practice (use of templates, snippets).		
30.0	Demonstrate language arts knowledge and skills. – The student will be able to:		
30.01	Locate, comprehend and evaluate key elements of oral and written information.		
30.02	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
30.03	Present information formally and informally for specific purposes and audiences.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
31.0 Demonstrate mathematics knowledge and skills. – The student will be able to:		
31.01 Demonstrate knowledge of arithmetic operations.		
31.02 Analyze and apply data and measurements to solve problems and interpret documents.	MAFS.912.A-REI.1.1	SC.912.N.1.1
31.03 Construct charts/tables/graphs using functions and data.	MAFS.912.F-IF.2.4	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **User Interface Design**
Course Number: **9001120**
Course Credit: **1**

Course Description:

This course provides advanced concepts used in interface design. The content includes principles of Human Computer Interface (HCI), advanced page design using Cascading Style Sheets (CSS), advanced HTML commands, multimedia applications, Internet/Intranet tools, and website promotion.

Florida State Standards			Correlation to CTE Program Standard #
32.0	Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Development.		
32.01	Key Ideas and Details		
	32.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	32.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	32.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
32.02	Craft and Structure		
	32.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	32.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	32.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida State Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
32.03	Integration of Knowledge and Ideas		
	32.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	32.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	32.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
32.04	Range of Reading and Level of Text Complexity		
	32.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	32.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
33.0	Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Development.		
33.01	Text Types and Purposes		
	33.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	33.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
33.02	Production and Distribution of Writing		
	33.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	33.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	33.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida State Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	33.03	Research to Build and Present Knowledge	
	33.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	33.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	33.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	33.04	Range of Writing	
	33.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
34.0	Methods and strategies for using Florida State Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Web Development.		
	34.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	34.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	34.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	34.04	Model with mathematics. MAFS.K12.MP.4.1	
	34.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	34.06	Attend to precision. MAFS.K12.MP.6.1	
	34.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida State Standards	Correlation to CTE Program Standard #
34.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
35.0 Incorporate Human Computer Interface (HCI) principles of design. – The student will be able to:		
35.01 Describe the fundamental design principles of human computer interface.		
35.02 Differentiate between computer and human factors in screen/page design.		
35.03 Describe what is meant by an “intuitive” interface.		
35.04 Describe how typography, color scheme, and graphic usage are used to set website feel/tone for various types of websites (e.g., educational, entertainment, ecommerce).Identify and use the following design concepts: contrast, repetition, alignment, proximity, writing style.		
35.05 Identify and use the following design concepts: contrast, repetition, alignment, proximity, writing style.		
35.06 Define and establish logo, identity, and branding needed for an effective website.		
35.07 Evaluate the HCI features included on a webpage storyboard.		
35.08 Create a series of webpage storyboards that incorporate HCI design principles.	MAFS.912.G-MG.1.3	
36.0 Research and obtain information for use in designing the user interface. – The student will be able to:		
36.01 Identify common user information needs, information gathering models, and methods for gathering user research.		
36.02 Define the primary audience and customer expectations and develop a rubric for defining user tasks and corresponding functionality.		
36.03 Describe target audience preferences based on demographics (e.g., gender, age, economic status, culture).		
36.04 Identify and use web analytic tools to shape an information architecture strategy (determine keywords).		
36.05 Apply the results of research and analytics to the design of a user interface.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
37.0	Create an intuitive interface using Cascading Style Sheets (CSS). – The student will be able to:		SC.912.N.1.3
37.01	Create CSS styles suitable for use on an intuitive webpage interface.		
37.02	Use element selectors, ID selectors, class selectors, pseudo-class selectors, and descendant selectors to create a table-less webpage design.		
37.03	Create a series of templates formatted exclusively using CSS.		
37.04	Use CSS syntax to configure and apply style sheets for multiple media displays (e.g., screen display and print).		
37.05	Create webpage templates using advanced CSS methods (e.g., create multi-column layouts, mimic client-side technologies, create faux columns).		
37.06	Differentiate among static, relative, absolute, and fixed positioning schemas.		
37.07	Use schemas to design a website: fixed, liquid, elastic designs.		
37.08	Recognize browser support for static, relative, absolute, and fixed positioning schemas.		
37.09	Identify and correct display issues in a web page using multiple browsers.		
38.0	Demonstrate proficiency creating a logical website file structure. – The student will be able to:		
38.01	Create an efficient, maintainable directory structure for a website, including the site root and subfolders for assets (e.g., images, templates, CSS).		
38.02	Demonstrate and use correct file paths for relative, site root relative, and absolute links.		
39.0	Create a CSS formatted informational website. – The student will be able to:		
39.01	Use GUI (Graphical User Interface) web authoring software to create a multi-page informational website.		
39.02	Create documented CSS style sheets for layout and appearance purposes.		
39.03	Incorporate methods used to drive traffic to the website, then engage and retain visitors.		
39.04	Apply standard optimization practices (e.g., keyword proximity; density; relevance; appropriate page titles, URLs, and headings, alt tags) to enhance search engine performance.		
39.05	Use standard design techniques to correctly display a website using multiple browsers (e.g., box model, hasLayout, Internet Explorer Conditional Comments (IECC)).		
39.06	Integrate common multimedia and plug-ins as appropriate to enhance a website design.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	39.07 Use client-side technologies such as rollovers, check plug-ins, and pop-up windows to enhance the user interface.		
40.0	Demonstrate proficiency publishing, testing, monitoring, and maintaining a website. – The student will be able to:		
	40.01 Recognize the relationship between local and remote site structure.		
	40.02 Identify methods of acquiring a domain name, appropriate hosting, and search engine registry.		
	40.03 Understand and implement strategies to measure website traffic and improve search engine analytics reports.		
	40.04 Describe the use of standard web marketing technologies (e.g., blogging, podcasting).		
	40.05 Describe how social media and social networking sites can be used for marketing purposes.		
	40.06 Test websites using common resolutions, browsers, accessibility, and validation techniques.		
	40.07 Use popular Internet browsers and tools as defined by W3C Browser Statistics (e.g., Mozilla Firefox (Web Developer Toolbar, ColorZilla, MeasureIt, Firebug), Internet Explorer 7/8) to display and troubleshoot websites.		
	40.08 Explore standard practices for feedback and usability testing.		
	40.09 Identify and incorporate standard security measures in a website.		
	40.10 Identify and use online validation tools.		
	40.11 Successfully change invalid markup to comply with standards.		
	40.12 Build a webpage that successfully passes the W3C validation test at http://validator.w3.org .		
	40.13 Write markup that facilitates accessibility.		
	40.14 Use FTP to transfer files to a server.		
	40.15 Set up an FTP connection to a remote site and reproduce the site structure on the server.		
41.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
	41.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		
	41.02 Locate, organize and reference written information from various sources.		
	41.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.		SC.912.N.1.4

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
41.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.		
41.05	Apply active listening skills to obtain and clarify information.		
41.06	Develop and interpret tables and charts to support written and oral communications.		
41.07	Exhibit public relations skills that aid in achieving customer satisfaction.		SC.912.N.1.1
42.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
42.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.		
42.02	Employ critical thinking and interpersonal skills to resolve conflicts.		SC.912.N.1.3
42.03	Identify and document workplace performance goals and monitor progress toward those goals.		SC.912.N.1.3
42.04	Conduct technical research to gather information necessary for decision-making.		
43.0	Use information technology tools. – The student will be able to:		SC.912.N.1.4
43.01	Use personal information management (PIM) applications to increase workplace efficiency.		
43.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
43.03	Employ computer operations applications to access, create, manage, integrate, and store information.		
43.04	Employ collaborative/groupware applications to facilitate group work.		
44.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
44.01	Describe the nature and types of business organizations.		
44.02	Explain the effect of key organizational systems on performance and quality.		
44.03	List and describe quality control systems and/or practices common to the workplace.		
44.04	Explain the impact of the global economy on business organizations.		
45.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
45.01	Evaluate and justify decisions based on ethical reasoning.		
45.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		SC.912.L.16.10

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
45.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.		SC.912.L.16.10
45.04 Interpret and explain written organizational policies and procedures.		SC.912.L.16.10

Florida Department of Education
Student Performance Standards

Course Title: **Web Scripting Fundamentals**
Course Number: **9001130**
Course Credit: **1**

Course Description:

This course provides an introduction to scripting related to web development. The content primarily focuses on client-side scripting using JavaScript.

Florida State Standards			Correlation to CTE Program Standard #
32.0	Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Development.		
	32.01 Key Ideas and Details		
	32.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	32.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	32.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	32.02 Craft and Structure		
	32.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	32.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	32.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
	32.03 Integration of Knowledge and Ideas		
	32.03.1	Integrate and evaluate multiple sources of information presented in	

Florida State Standards			Correlation to CTE Program Standard #
		diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	32.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	32.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
32.04	Range of Reading and Level of Text Complexity		
	32.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	32.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
33.0	Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Development.		
33.01	Text Types and Purposes		
	33.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	33.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
33.02	Production and Distribution of Writing		
	33.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	33.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	33.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	

Florida State Standards			Correlation to CTE Program Standard #
33.03	Research to Build and Present Knowledge		
	33.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	33.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	33.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
33.04	Range of Writing		
	33.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
34.0	Methods and strategies for using Florida State Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Web Development.		
34.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
34.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
34.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
34.04	Model with mathematics. MAFS.K12.MP.4.1		
34.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
34.06	Attend to precision. MAFS.K12.MP.6.1		
34.07	Look for and make use of structure. MAFS.K12.MP.7.1		
34.08	Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
46.0	Discuss the differences between server-side and client-side scripting. – The student will be able to:		
46.01	Describe the role scripting languages play in the creation of websites.		
46.02	Identify and describe the advantages, disadvantages, and primary uses of popular scripting languages (e.g., JavaScript, VBScript, Perl, PHP, JScript).	MAFS.912.S-CP.1.1	
47.0	Compare and contrast client-side scripting languages (JavaScript, VBScript, and ECMAScript). – The student will be able to:		
47.01	Describe the primary usage and limitations of JavaScript in a web environment.		
47.02	Describe how JavaScript blends with other web-authoring technologies (i.e., HTML, CSS, Server-side programming, Plug-ins).		
47.03	Describe the primary differences between JavaScript and VBScript.		
47.04	Describe the source, features, and common uses of ECMAScript.		
47.05	Explain why JavaScript use far exceeds VBScript for client-side scripting.		
47.06	Research resources available to advance JavaScript knowledge.		
47.07	Explore emerging trends and upcoming revisions related to JavaScript.		
48.0	Demonstrate understanding of the Document Object Model (DOM). – The student will be able to:		
48.01	Describe the purpose of the Document Object Model (layout, objects, properties, methods).		
48.02	Describe how JavaScript uses the DOM to detect and manipulate elements on a webpage.		
49.0	Design, write, debug, and incorporate a JavaScript client-side script into a webpage. – The student will be able to:		
49.01	Write, analyze and explain JavaScript syntax.		
49.02	Describe usage of various data types.		
49.03	Describe how the use of decision-making logic (AND, OR) is employed in a JavaScript program.		
49.04	Create and use variables, operators, and expressions.	MAFS.912.A-SSE.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
49.05	Use common JavaScript events and event handlers (e.g., click, load, onClick, onLoad) to control program flow, appearance, or functionality.		
49.06	Understand and incorporate JavaScript arrays (e.g., array basics, types, usage, methods, sorting).	MAFS.912.N-VM.3.6	
49.07	Understand and incorporate JavaScript functions (e.g., using the DOM, pass a value, return value, create objects, work with classes, objects).	MAFS.912.F-BF.1.1	
49.08	Understand and incorporate JavaScript loops and conditions (e.g., loop basics, types, usage).	MAFS.912.F-BF.1.1	
49.09	Recognize, isolate, and correct common JavaScript errors (e.g., syntax, function errors, reserved word usage, unsupported DOM).		
49.10	Identify limitations related to obsolete JavaScript constructs and coding practices (e.g., Document.all, navigator.appName).		
49.11	Apply JavaScript best coding practices (i.e., properly documenting scripts, field naming conventions, writing understandable code).		
49.12	Use different methods to incorporate JavaScript onto a web page (e.g., <script> element, JavaScript statement block, external scripts).		
49.13	Troubleshoot and test incorporated script (i.e., functionality, browser usage, resolve known bugs).		
50.0	Incorporate basic JavaScript form validation and form handling (using pre-built validation scripts or online libraries). – The student will be able to:		
50.01	Identify and use form elements to solicit user input.		
50.02	Use JavaScript with HTML form controls.		
50.03	Validate web forms prior to submission.		
50.04	Use output commands to display processed data in an appropriately formatted form.		
51.0	Use advanced JavaScript techniques. – The student will be able to:		
51.01	Write JavaScript suitable for plug-in detection, image manipulation, and the creation of custom JavaScript objects.		
51.02	Use JavaScript to incorporate, create, update, and delete cookies.		
51.03	Describe the common security issues relevant to JavaScript.		
52.0	Demonstrate understanding of JavaScript accessibility issues. – The student will be able to:		
52.01	Describe the purpose of the Browser Object Model (BOM) and how it relates to JavaScript.		
52.02	Describe how obsolete constructs and coding practices affect browser function.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	52.03 Make webpages accessible and functional when JavaScript disabled or unsupported.		
	52.04 Demonstrate ability to use XHTML, HTML, and CSS instead of JavaScript where appropriate.		
	52.05 Demonstrate ability to determine which version of JavaScript specific browsers support and code program to meet acceptable standards.		
53.0	Select and modify appropriate library and pre-built JavaScript to incorporate into webpage. – The student will be able to:		
	53.01 Explore common JavaScript libraries and describe the advantages and disadvantages of using libraries.		
	53.02 Analyze pre-built library items to determine functionality.		
	53.03 Explain how a library item achieves desired processing.		
	53.04 Determine if pre-built script provides functionality required in an effective manner.		
	53.05 Incorporate pre-built library items into web pages.		
	53.06 Identify the restrictions related to using pre-built scripts (i.e.; copyright, processing, and length of script).		
	53.07 Modify pre-built scripts to suit functionality requirements.		
	53.08 Test and troubleshoot pre-built scripts and widgets incorporated into web pages.		

Florida Department of Education
Student Performance Standards

Course Title: **Media Integration Essentials**
Course Number: **9001140**
Course Credit: **1**

Course Description:

This course provides in-depth instruction into techniques for integrating various forms of media onto webpages, with particular focus on XML and AJAX technologies and frameworks. Students should have a good understanding of JavaScript prior to taking this course.

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
54.0	Incorporate graphics, animations, and video assets into a webpage design using conventional HTML techniques. – The student will be able to:		
54.01	Use the HREF tag to integrate a video file displayed in a new window.		
54.02	Use the EMBED tag to display a graphic animation or a video file as part of the webpage fabric.		
54.03	Discuss the limitations of conventional media integration techniques.		
55.0	Demonstrate understanding of XML vocabularies and documents. – The student will be able to:		
55.01	Understand XML vocabularies.		
55.02	Define well-formed and valid XML documents.		
55.03	Describe the basic structure of an XML document.		
56.0	Create and debug an XML Document. – The student will be able to:		
56.01	Create an XML declaration.		
56.02	Work with XML comments.		
56.03	Create XML elements and attributes.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	56.04 Work with character and entity references.		
	56.05 Describe how XML handles character data, parsed character data, and white space.		
	56.06 Work with XML parsers.		
	56.07 Understand how Web browsers work with XML documents.		
	56.08 Apply a style sheet to an XML document.		
	56.09 Create an XML processing instruction.		
57.0	Create and debug compound documents with Namespaces. – The student will be able to:		
	57.01 Understand compound documents & the problem of name collision.		
	57.02 Declare a namespace for an XML vocabulary.		
	57.03 Apply a namespace to an element.		
	57.04 Create a default namespace.		
	57.05 Apply a namespace to an attribute.		
	57.06 Declare a namespace within a CSS style sheet.		
	57.07 Apply a namespace to a style selector.		
	57.08 Use the escape character to apply a namespace to a selector.		
	57.09 Create a compound document containing XML and XHTML elements and attributes.		
58.0	Demonstrate ability to validate documents with a Data Type Definition (DTD). – The student will be able to:		
	58.01 Understand the principles of data validation.		
	58.02 Create a DOCTYPE.		
	58.03 Specify the content of an XML element.		
	58.04 Define the structure of child elements.		
	58.05 Describe how DOCTYPE changed from HTML4.01 to HTML5.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
59.0	Demonstrate ability to validate documents with XML Schema. – The student will be able to:		
59.01	Compare schemas and DTDs.		
59.02	Explore different schema vocabularies.		
59.03	Declare simple type elements and attributes.		
59.04	Declare complex type elements.		
59.05	Apply a schema to an instance document.		
59.06	Work with XML Schema data types.		
59.07	Derive new data types for text strings, numeric values, and dates.		
59.08	Create data types for patterned data using regular expressions.		
59.09	Explore different schema structures.		
59.10	Attach a schema to a namespace.		
59.11	Validate compound instance documents.		
59.12	Import one schema file into another.		
60.0	Demonstrate an understanding of Asynchronous JavaScript and XML (AJAX) and its implications for web developers. – The student will be able to:		
60.01	Identify the technologies that comprise AJAX and explain how they interact.		
60.02	Describe the purpose, advantages, disadvantages, and functions of AJAX.		
60.03	Describe how AJAX works and how it is used in the creation of websites.		
60.04	Identify AJAX requirements.		
60.05	Install and setup the AJAX Control Toolkit.		
60.06	Define appropriate use of AJAX in a web project.		
60.07	Identify AJAX Usability and Accessibility issues and their workarounds.		
60.08	Describe AJAX related browser compatibility issues and their workarounds.		
60.09	Explore popular AJAX applications currently on the Internet (auto-complete (Google),		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	updating user content (Twitter), voting and rating (social bookmarking)).		
60.10	Describe common security issues associated to AJAX.		
60.11	Analyze the server-side implications of AJAX applications.		
60.12	Explore methods for testing and maintaining an AJAX application.		
60.13	Explore the future of AJAX and its implementation.		
61.0	Plan and implement a multi-page website that features graphics, pictures, and video galleries using AJAX techniques. – The student will be able to:		
61.01	Research AJAX design principles and patterns (e.g., Observer, Command and MVC).		
61.02	Research and compare popular AJAX frameworks, libraries, and toolkits (e.g., JQuery, DOJO, Prototype).		
61.03	Identify and implement methods of using AJAX when JavaScript not available (e.g. progressive enhancement).		
61.04	Update specific areas of a page with data from the server (e.g., server-login updated) without reloading the webpage.		
61.05	Demonstrate the ability to output results in different formats (e.g., XML, JSON, alternatives to JavaScript).		
61.06	Use AJAX to create form submission and validation (e.g. password strength check, email/URL validation).		
61.07	Integrate a basic slideshow via lightbox using AJAX techniques.		
61.08	Integrate optional video selections displayed using AJAX techniques.		

Florida Department of Education
Student Performance Standards

Course Title: **E-commerce & Marketing Essentials**
Course Number: **9001150**
Course Credit: **1**

Course Description:

This course provides instruction in the design, creation, marketing, and monitoring of e-commerce websites. Content also includes the associated security issues and methods.

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
62.0	Demonstrate knowledge and skills necessary to setup a secure E-commerce site–The student will be able to:		
62.01	Compare and contrast popular pre-built shopping cart software (e.g., PrestaShop, Zend Cart).	MAFS.912.S-CP.1.1	
62.02	Compare and contrast hosting options available for use with shopping cart software (i.e., shared hosting or dedicated server).	MAFS.912.S-CP.1.1	
62.03	Discuss shopping cart vulnerabilities and best-practice preventative measures.		
62.04	Identify hardware and software necessary to install and setup pre-built shopping cart software.		
62.05	Install and configure necessary software (database, server) to run pre-built shopping cart software.		
62.06	Install and configure pre-built shopping cart software.		
62.07	Verify database and server connectivity.		
62.08	Test and troubleshoot setup/configuration issues.		
63.0	Identify security issues associated with E-commerce and discuss methods to mitigate risks. – The student will be able to:		
63.01	Describe the differences between Transaction Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL).		
63.02	Explain transaction security.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
63.03	Identify security and payment processing issues involved in developing a site (e.g., SSL, Digital Certificates, SET Protocol, Cyber Cash).		
63.04	Demonstrate understanding of https and htaccess and their usage.		
63.05	Explore methods to obtain an SSL certificate and secure transactions.		
63.06	Compare and contrast the appropriateness of employing a merchant account or a payment gateway to handle online transactions.		
63.07	Discuss the process, advantages, disadvantages, and costs associated with opening a merchant account.		
63.08	Describe the process, advantages, disadvantages, and costs associated with using a payment gateway.		
64.0	Apply skills necessary to setup an E-commerce storefront. – The student will be able to:		
64.01	Setup and use an FTP (File Transfer Protocol) program to transfer files to a web server.		
64.02	Add business specific information to site storefront (e.g., logos, product images, descriptions).		
64.03	Setup back-end site administration functions and navigation.		
64.04	Setup a schema for incorporating shipping, handling, and processing fees based on carrier, geographical zones, and weight/price range.		
64.05	Experiment with various add-ons, themes, and modules available for customization.		SC.912.N.1.3
64.06	Customize shopping cart to suit client needs (e.g., modify fields, add buttons).		
64.07	Customize forms to accommodate client products and/or services.		
64.08	Setup Search preferences and functionality for products and/or services.		
64.09	Setup customer contact preferences and email notification functionality.		
64.10	Apply Search Engine Optimization (SEO) techniques to shopping cart pages.		
64.11	Test operation of shopping cart pages in multiple browsers.		SC.912.N.1.1
64.12	Troubleshoot issues and errors related to browser display and functionality.		SC.912.N.1.3

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
65.0	Employ techniques to enhance the value and profitability of an E-commerce website. – The student will be able to:		
65.01	Determine business goals for the E-commerce site.		
65.02	Identify the various types of advertising options in E-commerce (e.g., links, banner ads, affiliate programs, pop-up windows, viral marketing, newsgroup postings).		
65.03	Describe affiliate marketing and its implications for E-commerce websites.		
65.04	Analyze popular affiliate programs/networks and available payment schemes.		
65.05	Explain the differences, advantages, and disadvantages of CPM, PPC, and Pay per Sale/Lead.		
65.06	Determine appropriate affiliate program for target audience.		
65.07	Identify the method to join an affiliate program/network.		
65.08	Identify considerations/requirements of selecting an affiliate program.		
65.09	Determine appropriate number of affiliate programs necessary to suit client site.		
65.10	Determine the terms and conditions of sale, including warranties, after-sales service, and privacy assurances.		
65.11	Determine customer service options (e.g., e-mail, phone, fax).		
65.12	Create a site map.		
65.13	Create a Frequently Asked Questions (FAQ) page.		
65.14	Create a product/version comparison chart, where appropriate.		
65.15	Create feedback, review, survey, and recommendation pages.		
66.0	Develop evaluation and performance monitoring metrics and target goals for an E-commerce website. – The student will be able to:		
66.01	Research existing and emerging analytical, usability, SEO tools to improve customer satisfaction and site conversion rates.		
66.02	Describe web analytics tools and their features/functions.		
66.03	Use web analytics tools to determine optimum site keywords.		SC.912.N.1.1
66.04	Experiment with using advanced segments to view subsets of data (relating to purchasing habits, website usage, searches).	MAFS.912.S-IC.2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
66.05	Customize analytic reports using appropriate metrics (e.g., average per-visit value, bounce rates, time spent on page).		SC.912.N.1.1
66.06	Create more concise reports using advanced filters in web analytics tools.		
66.07	Use intelligence features of web analytics tools to discover patterns of usage and setup corresponding alerts.		
66.08	Research popular mobile analytics tools (e.g., Motally) and their features.		SC.912.N.1.1
66.09	Interpret analytic report data and optimize website accordingly, if appropriate.	MAFS.912.S-IC.2.6	SC.912.N.1.3

Florida Department of Education
Student Performance Standards

Course Title: **Interactivity Essentials**
Course Number: **9001160**
Course Credit: **1**

Course Description:

This course provides instruction on technologies and techniques for enhancing the interactivity of websites from both site visitor and administration perspectives. Also covered are methods for PDF forms handling and content management.

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
67.0	Demonstrate an understanding of Content Management Systems (CMS) and their implications for web development. – The student will be able to:		
67.01	Describe the fundamental operation of a CMS.		
67.02	Describe the typical features of a content management system.		
67.03	Compare and contrast popular CMS applications (e.g., WordPress, Joomla).	MAFS.912.S-CP.1.1	
67.04	Describe how a content management system can be used to enhance website interactivity.		
67.05	Demonstrate proficiency installing and configuring content management systems and extensions/modules.		
68.0	Use CMS features, functions, and extensions/modules to create/enhance a website. – The student will be able to:		
68.01	Create a basic multipage website using a content management system.		
68.02	Enhance a webpage by using a content management system to incorporate images, animations, or video segments.		
68.03	Incorporate a blog feature into a website using a content management system.		
68.04	Demonstrate proficiency using CMS built-in security for website, password and database backup.		
68.05	Demonstrate proficiency using add-on modules, or plug-ins.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
69.0	Evaluate the suitability for and system requirements for a content management system. – The student will be able to:		
69.01	Identify business goals and evaluate their suitability for a content management system.		
69.02	Determine web hosting system requirements.		
69.03	Create a schema for creating, deleting, and managing users and their permissions.		
69.04	Discuss the value represented by templates in a content management system development environment.		
70.0	Demonstrate an understanding of multimedia applications and their implications for web designers. – The student will be able to:		
70.01	Compare and contrast the leading multimedia development applications for website development (e.g., Adobe Flash, Microsoft Silverlight).		
70.02	Describe those circumstances whereby multimedia may be used to add interactivity to a website.		
70.03	Describe the limitations of multimedia development applications relative to website development.		
71.0	Create and incorporate interactive website components. – The student will be able to:		
71.01	Create buttons, menus, and other components that feature a static, hover, and rollover effect.		
71.02	Convert original artwork into an interactive component with associated script behavior.		
71.03	Adjust the component properties including opacity, filter, rotation, and action.		
71.04	Resize a multi-layer component to ensure uniform resizing of each layer.		
71.05	Create scrolling images, panels, and lists for incorporating into a web design.		
71.06	Create and incorporate animated banners, headers, and website introduction pages (e.g., Adobe Flash, Microsoft Silverlight).		
72.0	PDF document usage considerations. – The student will be able to:		
72.01	Discuss the advantages and disadvantages of using PDF documents in a web site.		
72.02	Research and discuss PDF document usage best practices.		SC.912.N.1.3
72.03	Determine when it is appropriate to use PDF documents (e.g., brochure downloads, large reports, catalogs, interactive forms).		
72.04	Compare and contrast the functionality of software applications used to create and process PDFs.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
72.05	Research and describe search engine optimization considerations related to the use of PDF documents.		SC.912.N.1.3
72.06	Research and discuss security issues related to PDF document usage in a web site (viruses, auto-open).		SC.912.N.1.3
72.07	Identify accessibility issues related to using PDF documents in a web site.		
73.0	Create, format, and manipulate PDF documents. – The student will be able to:		
73.01	List & describe the methods available for creating PDF documents.		
73.02	Create a PDF using a variety of software applications, multiple files, and web pages.		
73.03	Demonstrate ability to format, modify and enhance a PDF document.		
73.04	Describe the differences in PDF standards for document prepress data interchange and long-term archiving.		
73.05	Embed images, text, audio, video, and Flash content into a PDF document.		
73.06	Create and modify automatically generated and manual bookmarks in a PDF document.		
73.07	Add clickable links to a PDF document.		
73.08	Incorporate Find and Search methods to locate specific text in a PDF document.		
73.09	Describe the method used to search scanned documents (optical character recognition).		
73.10	Understand and correct color separation issues.		
73.11	Create and modify PDF documents using available tools to meet accessibility requirements (e.g., tags, reading order, forms, supplemental content for multimedia, text-to-speech).		
73.12	Export a PDF document in a different format.		
74.0	Display, distribution, and print considerations for PDF documents. – The student will be able to:		
74.01	Define file specifications use to generate smaller files for electronic distribution and on-screen display.		
74.02	Specify image downsampling and compression settings to generate a PDF file with a smaller file size.		
74.03	Identify and correct potential printing issues in a PDF document.		
74.04	Ensure a PDF document meets appropriate criteria for print or electronic distribution.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
74.05	Demonstrate ability to control flattening of a transparent PDF document and misregistration.		
74.06	Demonstrate color management techniques that affect on-screen display and printing.		
74.07	Discuss methods and tools used to review a PDF document (email, shared, tracking).		
75.0	Create and manage PDF forms. – The student will be able to:		
75.01	Create an interactive from using fields, form objects, and distribution methods.		
75.02	Distribute a form electronically and manage distributed forms.		
75.03	Demonstrate ability to redact content in a form to protect sensitive information.		
75.04	Preview, test, and modify an interactive form.		SC.912.N.1.3
76.0	Incorporate PDF security in a PDF document. – The student will be able to:		
76.01	Secure a PDF document using passwords, encryption, digital IDs and signatures.		
76.02	Creating Security Policies and Certificates for a PDF document.		
76.03	Enable usage rights for Adobe Readers.		
77.0	Demonstrate proficiency using HTML5 features and functions. – The student will be able to:		
77.01	Apply HTML5 APIs in web pages for interactivity (e.g., audio/video, drag & drop, drawing canvas).		
77.02	Apply HTML5 interactivity elements into web pages (i.e., <canvas>, <embed>, <audio>, <video>, <details> <input>).		
77.03	Utilize HTML5 fallback strategies to address browser support issues.		
77.04	Utilize HTML5 to define dynamic behaviors using JavaScript.		
77.05	Use HTML5 specification to manipulate text and images.		
77.06	Use HTML5 to create persistent data and single session storage (HTML 5 Local Offline Storage & Session Storage).		
77.07	Use HTML5 for media event handling (audio, video, embed, image).		
77.08	Use HTML5 event handling for window, mouse, and form events.		
77.09	Use CSS3 to style HTML5 (e.g., transitions, typography enhancements).		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Computer Systems & Information Technology (CSIT)**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9001200
CIP Number	0511090107
Grade Level	9-12, 30, 31
Standard Length	6 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMP SVC 7G INFO TECH 7G CYBER TECH 7G ELECTRONIC @7 7G
CTSO	FBLA BPA Skills USA
SOC Codes (all applicable)	15-1152 – Computer Network Support Specialists 15-1142 – Network and Computer Systems Administrators 15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of occupations in the information technology industry.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the information technology industry; technical and product skills, underlying principles of technology , planning, management, finance, labor issues, community issues and health, safety, and environmental issues.

The course content includes, but is not limited to, communication, leadership skills, human relations and employability skills; and safe, efficient work practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction aligned with industry standards, consisting of four occupational completion points. When the recommended sequence is followed, the structure is intended to prepare students to complete the CompTIA A+, Network+, and Security+ industry certifications. Sufficient coverage of advanced networking concepts and competencies may also lead to Cisco's CCENT and CCNA industry certifications.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	9001210	CSIT Foundations **Or**	1 credit	15-1151	3	VO
	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	9001220	CSIT System Essentials	1 credit	15-1151	3	VO
C	9001230	CSIT Network Systems Configuration	1 credit	15-1142	3	VO
D	9001240	CSIT Network Systems Design & Administration	1 credit	15-1142	3	VO
	9001250 9001260	CSIT Cyber Security Essentials CSIT Cyber Security - Physical	1 credit 1 credit	15-1122	3 3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
9001210	#	#	19/83 23%	#	19/67 28%	#	0/69 0%	19/82 23%	#	19/74 26%	#
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9001220	#	#	19/83 23%	0/69 0%	19/67 28%	#	#	19/82 23%	#	19/74 26%	#

9001230	19/87 22%	19/80 24%	#	19/69 28%	#	19/70 27%	19/69 28%	#	14/66 21%	#	19/72 26%
9001240	19/87 22%	19/80 24%	#	19/69 28%	#	19/70 27%	19/69 28%	#	14/66 21%	#	19/72 26%
9001250	#	#	#	#	#	#	#	#	#	#	#
9001260	#	#	#	#	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
9001210	10/67 15%	10/75 13%	10/54 19%	#	#	#	#
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
9001230	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
9001240	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
9001250	#	#	#	#	#	#	#
9001260	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the [Insert Career Cluster Name] Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Demonstrate proficiency with personal computer hardware.
19.0 Demonstrate proficiency in troubleshooting, repair and maintenance.
20.0 Demonstrate proficiency with operating systems and software.
21.0 Demonstrate proficiency with networking.
22.0 Demonstrate proficiency with security.
23.0 Explain the basic physical security elements of a network.
24.0 Demonstrate proficiency with operational procedure.
25.0 Demonstrate language arts knowledge and skills.
26.0 Demonstrate mathematics knowledge and skills.
27.0 Demonstrate proficiency with installing, configuring, and troubleshooting personal computer hardware.
28.0 Demonstrate proficiency with troubleshooting operating systems.
29.0 Demonstrate proficiency with networking.

30.0 Demonstrate proficiency with security.
31.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
32.0 Solve problems using critical thinking skills, creating and innovation.
33.0 Use information technology tools.
34.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
35.0 Describe the importance of professional ethics and legal responsibilities.
36.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).
37.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).
38.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).
39.0 Describe the operation of data networks.
40.0 Verify connectivity between two end devices.
41.0 Configure a Layer 3 switch.
42.0 Configure a router with basic configurations.
43.0 Explain how IPv6 address assignments are implemented in a business network.
44.0 Explain how data is moved across the network, from opening an application, to receiving data.
45.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
46.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
47.0 Explain the importance of employability skill and entrepreneurship skills.
48.0 Describe a switched network.
49.0 Compare a collision domain to a broadcast domain.
50.0 Troubleshoot inter-VLAN routing in a Layer 3-switched environment.
51.0 Configure ACLs.
52.0 Configure DHCPv4.
53.0 Configure NAT.
54.0 Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends.
55.0 Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk.
56.0 Recognize and be able to differentiate and explain the following access control models.
57.0 Recognize and be able to differentiate and explain the following methods of authentication.
58.0 Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk.
59.0 Recognize and understand the processes and risks associated with the following security concerns and tasks.
60.0 Recognize and understand the administration of the following types of remote access technologies.
61.0 Recognize and understand the administration of the following email security concepts.
62.0 Recognize and understand the administration of the following Internet security concepts.
63.0 Recognize and understand the administration of the following vulnerabilities.
64.0 Recognize and understand the administration of the following directory security concepts.
65.0 Recognize and understand the administration of the following file transfer protocols and concepts.
66.0 Recognize and understand the administration of the following wireless technologies and concepts.
67.0 Compare and contrast the following types of intrusion detection in terms of implementation and configuration.

68.0 Be able to identify and explain the following different kinds of cryptographic algorithms.
69.0 Understand how cryptography and digital signatures address the following security concepts.
70.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure).
71.0 Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles.
72.0 Understand the application of the following concepts of physical security.
73.0 Understand security concerns and concepts of the following types of devices.
74.0 Understand the security concerns for the following types of media.
75.0 Explain the following security topologies as they relate to cybersecurity.
76.0 Implement the process of network system hardening within a computer network.
77.0 Implement the process of server application/service hardening within a computer network.
78.0 Describe the security implications of the following topics of disaster recovery options.
79.0 Understand the security implications of the following topics of business continuity.
80.0 Demonstrate proficiency in applying the concepts and uses of the following types of policies and procedures.
81.0 Explain the following concepts of privilege management.
82.0 Demonstrate an understanding of the concepts of the following topics of forensics.
83.0 Understand and be able to explain the following concepts of risk identification.
84.0 Understand the security relevance of the education and training of end users, executives and human resources.
85.0 Explain the following documentation and their role in cybersecurity.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **CSIT Foundations**
Course Number: **9001210**
Course Credit: **1**

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a	

Florida Standards			Correlation to CTE Program Standard #
		question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04 Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
	03.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
	03.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
	03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
	03.04 Model with mathematics. MAFS.K12.MP.4.1		
	03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1		
	03.06 Attend to precision. MAFS.K12.MP.6.1		
	03.07 Look for and make use of structure. MAFS.K12.MP.7.1		
	03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
18.0	Demonstrate proficiency with personal computer hardware. – The student will be able to:		
18.01	Categorize storage devices and backup media, including tape and solid state drives.		
18.02	Explain motherboard components, types and features.		
18.03	Classify power supplies types and characteristics.		
18.04	Explain the purpose and characteristics of CPUs and their features.		
18.05	Explain cooling methods and devices.		
18.06	Compare and contrast memory types, characteristics and their purpose.		
18.07	Distinguish between the different display devices and their characteristics.		
18.08	Install and configure peripherals and input devices.		
18.09	Summarize the function and types of adapter cards with PCIe standard.		
18.10	Install, configure and optimize laptop, tablets and mobile phones components.		
18.11	Install and configure printers and add network printers using static IP address.		
18.12	Explain advantages of using PCIe adapter cards.		
18.13	Configure tablets and mobile phones.		
18.14	Configure network printers using a static IP address.		
19.0	Demonstrate proficiency in troubleshooting, repair and maintenance. – The student will be able to:		
19.01	Explain the troubleshooting theory.		
19.02	Explain and interpret common hardware symptoms and their causes.		
19.03	Explain and interpret common operating system symptoms and their causes.		
19.04	Determine the troubleshooting methods and tools for printers.		
19.05	Explain and interpret common laptop issues and determine the appropriate basic troubleshooting method.		

CTE Standards and Benchmarks			FS-M/LA	NGSSS-Sci
19.06	Integrate common preventative maintenance techniques.			
19.07	Explain and interpret common software symptoms and their causes.			
20.0	Demonstrate proficiency with operating systems and software. – The student will be able to:			
20.01	Compare and contrast the different Windows Operating Systems from Windows 7 up and their features.			
20.02	Explain the difference in features of the various Windows versions from Windows 7 through Windows 10.			
20.03	Explain the process and steps to install and configure the Windows OS.			
20.04	Explain the basics of boot sequences, methods and startup utilities, including msconfig.			
21.0	Demonstrate proficiency with networking. – The student will be able to:			
21.01	Summarize the basics of networking fundamentals, including technologies and devices.			
21.02	Summarize the basics of networking fundamentals, including technologies and protocols.			
21.03	Categorize network cables and connectors and their implementations.			
21.04	Compare and contrast the different network types include SOHO networks.			
22.0	Demonstrate proficiency with security. – The student will be able to:			
22.01	Explain the basic principles of security concepts and technologies (physical, software, social engineering).			
22.02	Summarize the following security features:			
	22.02.1	Wireless encryption.		
	22.02.2	Malicious software protection.		
	22.02.3	BIOS Security.		
	22.02.4	Password management/password complexity.		
	22.02.5	Locking workstation.		
	22.02.6	Biometrics.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
23.0	Explain the basic physical security elements of a network. – The student will be able to:		
23.01	Explain the basic software security elements of a network, including firewalls, IDS and IPS.		
23.02	Explain how the human element plays a major role in network security, including social engineering.		
24.0	Demonstrate proficiency with operational procedure. – The student will be able to:		
24.01	Outline the purpose of appropriate safety and environmental procedures and given a scenario apply them.		
24.02	Given a scenario, demonstrate the appropriate use of communication skills and professionalism in the workplace including chain of custody.		
24.03	Explain chain of custody for various scenarios.		
25.0	Demonstrate language arts knowledge and skills. – The student will be able to:		
25.01	Locate, comprehend and evaluate key elements of oral and written information.		
25.02	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
25.03	Present information formally and informally for specific purposes and audiences.		
26.0	Demonstrate mathematics knowledge and skills. – The student will be able to:		
26.01	Demonstrate knowledge of arithmetic operations.		
26.02	Analyze and apply data and measurements to solve problems and interpret documents.		
26.03	Construct charts/tables/graphs using functions and data.		

Florida Department of Education
Student Performance Standards

Course Title: **CSIT System Essentials**
Course Number: **9001220**
Course Credit: **1**

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a	

Florida Standards			Correlation to CTE Program Standard #
		question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04 Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
	03.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
	03.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
	03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
	03.04 Model with mathematics. MAFS.K12.MP.4.1		
	03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1		
	03.06 Attend to precision. MAFS.K12.MP.6.1		
	03.07 Look for and make use of structure. MAFS.K12.MP.7.1		
	03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks			FS-M/LA	NGSSS-Sci
27.0	Demonstrate proficiency with installing, configuring, and troubleshooting personal computer hardware. – The student will be able to:			
27.01	Install, configure and maintain personal computer components.			
27.02	Detect problems, troubleshoot and repair/replace personal computer components.			
27.03	Install, configure, detect problems, troubleshoot and repair/replace laptop components.			
27.04	Select and use the following tools:			
	27.04.1	Multimeter.		
	27.04.2	Power supply tester.		
	27.04.3	Specialty hardware / tools.		
	27.04.4	Cable testers.		
	27.04.5	Loop back plugs.		
	27.04.6	Anti-static pad and wrist strap.		
	27.04.7	Extension magnet.		
	27.04.8	Detect and resolve common printer issues.		
28.0	Demonstrate proficiency with troubleshooting operating systems. – The student will be able to:			
28.01	Select the appropriate commands and options to troubleshoot and resolve problems.			
28.02	Differentiate between Windows Operating System directory structures (Windows 2000, XP, Vista, and Windows 7).			
28.03	Given a scenario, select and use system utilities / tools and evaluate the results.			
28.04	Evaluate and resolve common issues.			
29.0	Demonstrate proficiency with networking. – The student will be able to:			
29.01	Troubleshoot client-side connectivity issues using appropriate tools.			
29.02	Install and configure a small office home office (SOHO) network.			

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
30.0	Demonstrate proficiency with security. – The student will be able to:		
30.01	Given a scenario, prevent, troubleshoot and remove viruses and malware.		
30.02	Implement security and troubleshoot common issues.		
31.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
31.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		
31.02	Locate, organize and reference written information from various sources.		
31.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.		
31.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.		
31.05	Apply active listening skills to obtain and clarify information.		
31.06	Develop and interpret tables and charts to support written and oral communications.		
31.07	Exhibit public relations skills that aid in achieving customer satisfaction.		
32.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
32.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.		
32.02	Employ critical thinking and interpersonal skills to resolve conflicts.		
32.03	Identify and document workplace performance goals and monitor progress toward those goals.		
32.04	Conduct technical research to gather information necessary for decision-making.		
33.0	Use information technology tools. – The student will be able to:		
33.01	Use personal information management (PIM) applications to increase workplace efficiency.		
33.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
33.03	Employ computer operations applications to access, create, manage, integrate, and store information.		
33.04	Employ collaborative/groupware applications to facilitate group work.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
34.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
34.01	Describe the nature and types of business organizations.		
34.02	Explain the effect of key organizational systems on performance and quality.		
34.03	List and describe quality control systems and/or practices common to the workplace.		
34.04	Explain the impact of the global economy on business organizations.		
35.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
35.01	Evaluate and justify decisions based on ethical reasoning.		
35.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		
35.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.		
35.04	Interpret and explain written organizational policies and procedures.		
35.05	Explain various types of software licensing.		

Florida Department of Education
Student Performance Standards

Course Title: **CSIT Network Systems Configuration**
Course Number: **9001230**
Course Credit: **1**

Florida Standards			Correlation to CTE Program Standard #
36.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
36.01	Key Ideas and Details		
36.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
36.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
36.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
36.02	Craft and Structure		
36.02.1		Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
36.02.2		Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
36.02.3		Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
36.03	Integration of Knowledge and Ideas		
36.03.1		Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
36.03.2		Evaluate the hypotheses, data, analysis, and conclusions in a science or	

Florida Standards			Correlation to CTE Program Standard #
		technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	36.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
36.04	Range of Reading and Level of Text Complexity		
	36.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	36.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
37.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
37.01	Text Types and Purposes		
	37.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	37.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
37.02	Production and Distribution of Writing		
	37.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	37.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	37.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
37.03	Research to Build and Present Knowledge		
	37.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on	

Florida Standards			Correlation to CTE Program Standard #
		the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	37.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	37.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
37.04	Range of Writing		
	37.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
38.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
38.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
38.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
38.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
38.04	Model with mathematics. MAFS.K12.MP.4.1		
38.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
38.06	Attend to precision. MAFS.K12.MP.6.1		
38.07	Look for and make use of structure. MAFS.K12.MP.7.1		
38.08	Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
39.0	Describe the operation of data networks. – The student will be able to:		
39.01	Explain how multiple networks are used in everyday life.		
39.02	Explain the topologies and devices used in a small-to-medium-sized business network.		
39.03	Explain the basic characteristics of a network that supports communication in a small-to-medium-sized business.		
39.04	Explain trends in networking that will affect the use of networks in small-to-medium-sized businesses.		
39.05	Explain the purpose of the IOS.		
39.06	Explain how to access and navigate the IOS to configure network devices.		
39.07	Describe the command structure of the IOS software.		
39.08	Configure hostnames on an IOS device using the CLI.		
39.09	Use IOS commands to limit access to device configurations.		
39.10	Use IOS commands to save the running configuration.		
39.11	Explain how devices communicate across network media.		
39.12	Configure a host device with an IP address.		
40.0	Verify connectivity between two end devices. – The student will be able to:		
40.01	Explain how rules are used to facilitate communication.		
40.02	Explain the role of protocols and standards organizations in facilitating interoperability in network communications.		
40.03	Explain how devices on a LAN access resources in a small to medium-sized business network.		
40.04	Identify device connectivity options.		
40.05	Describe the purpose and functions of the physical layer in the network.		
40.06	Describe basic principles of the physical layer standards.		
40.07	Identify the basic characteristics of copper cabling.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
40.08	Build a UTP cable used in Ethernet networks.		
40.09	Describe fiber-optic cabling and its main advantages over other media.		
40.10	Describe wireless media.		
40.11	Select the appropriate media for a given requirement and connect devices.		
40.12	Describe the operation of the Ethernet sub layers.		
40.13	Identify the major fields of the Ethernet frame.		
40.14	Describe the purpose and characteristics of the Ethernet MAC address.		
40.15	Describe the purpose of ARP.		
40.16	Explain how ARP requests impact network and host performance.		
40.17	Explain basic switching concepts.		
40.18	Compare fixed configuration and modular switches.		
41.0	Configure a Layer 3 switch. – The student will be able to:		
41.01	Explain how network layer protocols and services support communications across data networks.		
41.02	Explain how routers enable end-to-end connectivity in a small to medium-sized business network.		
41.03	Determine the appropriate device to route traffic in a small to medium-sized business network.		
42.0	Configure a router with basic configurations. – The student will be able to:		
42.01	Describe the purpose of the transport layer in managing the transportation of data in end-to-end communication.		
42.02	Describe characteristics of the TCP and UDP protocols, including port numbers and their uses.		
42.03	Explain how TCP session establishment and termination processes facilitate reliable communication.		
42.04	Explain how TCP protocol data units are transmitted and acknowledged to guarantee delivery.		
42.05	Explain the UDP client processes to establish communication with a server.		
42.06	Determine whether high-reliability TCP transmissions, or non-guaranteed UDP transmissions, are best suited for common applications.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
42.07	Describe the structure of an IPv4 address.		
42.08	Describe the purpose of the subnet mask.		
42.09	Compare the characteristics and uses of the unicast, broadcast, and multicast IPv4 addresses.		
42.10	Compare the use of public address space and private address space.		
42.11	Explain the need for IPv6 addressing.		
42.12	Describe the representation of an IPv6 address.		
42.13	Describe types of IPv6 network addresses.		
42.14	Configure global unicast addresses.		
42.15	Describe multicast addresses.		
42.16	Describe the role of ICMP in an IP network. (Include IPv4 and IPv6.)		
42.17	Use ping and trace route utilities to test network connectivity.		
42.18	Explain why routing is necessary for hosts on different networks to communicate.		
42.19	Describe IP as a communication protocol used to identify a single device on a network.		
42.20	Given a network and a subnet mask, calculate the number of host addresses available.		
42.21	Calculate the necessary subnet mask in order to accommodate the requirements of a network.		
42.22	Describe the benefits of variable length subnet masking (VLSM).		
43.0	Explain how IPv6 address assignments are implemented in a business network. – The student will be able to:		
43.01	Explain how the functions of the application layer, session layer, and presentation layer work together to provide network services to end user applications.		
43.02	Describe how common application layer protocols interact with end user applications.		
43.03	Describe, at a high level, common application layer protocols that provide Internet services to end-users, including WWW services and email.		
43.04	Describe application layer protocols that provide IP addressing services, including DNS and DHCP.		
43.05	Describe the features and operation of well-known application layer protocols that allow for file sharing services, including FTP, File Sharing Services, SMB protocol.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
44.0	Explain how data is moved across the network, from opening an application, to receiving data. – The student will be able to:		
44.01	Identify the devices and protocols used in a small network.		
44.02	Explain how a small network serves as the basis of larger networks.		
44.03	Describe the need for basic security measures on network devices.		
44.04	Identify security vulnerabilities and general mitigation techniques.		
44.05	Configure network devices with device hardening features to mitigate security threats.		
44.06	Use the output of ping and trace commands to establish relative network performance.		
45.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
45.01	Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		
45.02	Explain emergency procedures to follow in response to workplace accidents.		
45.03	Create a disaster and/or emergency response plan.		
46.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
46.01	Employ leadership skills to accomplish organizational goals and objectives.		
46.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
46.03	Conduct and participate in meetings to accomplish work tasks.		
46.04	Employ mentoring skills to inspire and teach others.		
47.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
47.01	Identify and demonstrate positive work behaviors needed to be employable.		
47.02	Develop personal career plan that includes goals, objectives, and strategies.		
47.03	Examine licensing, certification, and industry credentialing requirements.		
47.04	Maintain a career portfolio to document knowledge, skills, and experience.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
47.05 Evaluate and compare employment opportunities that match career goals.		
47.06 Identify and exhibit traits for retaining employment.		
47.07 Identify opportunities and research requirements for career advancement.		
47.08 Research the benefits of ongoing professional development.		
47.09 Examine and describe entrepreneurship opportunities as a career planning option.		

Florida Department of Education
Student Performance Standards

Course Title: **CSIT Network Systems Design & Administration**
Course Number: **9001240**
Course Credit: **1**

Florida Standards			Correlation to CTE Program Standard #
36.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
36.01	Key Ideas and Details		
	36.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	36.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	36.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
36.02	Craft and Structure		
	36.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	36.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	36.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
36.03	Integration of Knowledge and Ideas		
	36.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	

Florida Standards			Correlation to CTE Program Standard #
	36.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	36.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
36.04	Range of Reading and Level of Text Complexity		
	36.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	36.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
37.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
37.01	Text Types and Purposes		
	37.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	37.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
37.02	Production and Distribution of Writing		
	37.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	37.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	37.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
37.03	Research to Build and Present Knowledge		
	37.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow	

Florida Standards			Correlation to CTE Program Standard #
		or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	37.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	37.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
37.04	Range of Writing		
	37.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
38.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Computer Systems & Information Technology (CSIT).		
38.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
38.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
38.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
38.04	Model with mathematics. MAFS.K12.MP.4.1		
38.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
38.06	Attend to precision. MAFS.K12.MP.6.1		
38.07	Look for and make use of structure. MAFS.K12.MP.7.1		
38.08	Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
48.0 Describe a switched network. The student will be able to:		
48.01 Describe convergence of data, voice, and video in the context of switched networks.		
48.02 Describe a switched network in a small-to-medium-sized business.		
48.03 Explain the process of frame forwarding in a switched network.		
49.0 Compare a collision domain to a broadcast domain. The student will be able to:		
49.01 Explain the advantages and disadvantages of static routing.		
49.02 Configure initial settings on a Cisco switch.		
49.03 Configure switch ports to meet network requirements.		
49.04 Configure the management switch virtual interface.		
49.05 Describe basic security attacks in a switched environment.		
49.06 Describe security best practices in a switched environment.		
49.07 Configure the port security feature to restrict network access.		
49.08 Explain the purpose of VLANs in a switched network.		
49.09 Analyze how a switch forwards frames based on VLAN configuration in a multi-switched environment.		
49.10 Configure a switch port to be assigned to a VLAN based on requirements.		
49.11 Configure a trunk port on a LAN switch.		
49.12 Configure Dynamic Trunk Protocol (DTP).		
49.13 Troubleshoot VLAN and trunk configurations in a switched network.		
49.14 Configure security features to mitigate attacks in a VLAN-segmented environment.		
49.15 Explain security best practices for a VLAN-segmented environment.		
49.16 Configure a router to route between multiple directly connected networks.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
49.17	Describe the primary functions and features of a router.		
49.18	Explain how routers use information in data packets to make forwarding decisions in a small- to medium-sized business network.		
49.19	Explain the encapsulation and de-encapsulation process used by routers when switching packets between interfaces.		
49.20	Compare ways in which a router builds a routing table when operating in a small- to medium-sized business network.		
49.21	Explain routing table entries for directly connected networks.		
49.22	Explain how a router builds a routing table of directly connected networks.		
49.23	Describe the three primary options for enabling inter-VLAN routing.		
49.24	Configure legacy inter-VLAN routing.		
49.25	Configure router-on-a-stick inter-VLAN routing.		
49.26	Troubleshoot common inter-VLAN configuration issues.		
49.27	Troubleshoot common IP addressing issues in an inter-VLAN-routed environment.		
49.28	Configure inter-VLAN routing using Layer 3 switching.		
50.0	Troubleshoot inter-VLAN routing in a Layer 3-switched environment. – The student will be able to:		
50.01	Explain the advantages and disadvantages of static routing.		
50.02	Explain the purpose of different types of static routes.		
50.03	Configure IPv4 and IPv6 static routes by specifying a next-hop address.		
50.04	Configure an IPv4 and IPv6 default routes.		
50.05	Explain the use of legacy classful addressing in network implementation.		
50.06	Explain the purpose of CIDR in replacing classful addressing.		
50.07	Explain the basic operation of dynamic routing protocols.		
50.08	Compare and contrast dynamic and static routing.		
50.09	Determine which networks are available during an initial network discovery phase.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
50.10 Define the different categories of routing protocols.		
50.11 Describe the process by which distance vector routing protocols learn about other networks.		
50.12 Identify the types of distance-vector routing protocols.		
50.13 Configure the RIP routing protocol.		
50.14 Configure the RIPng routing protocol.		
50.15 Explain the process by which link-state routing protocols learn about other networks.		
50.16 Explain the process by which link-state routers learn about other networks.		
50.17 Describe the types of packets used by Cisco IOS routers to establish and maintain an OSPF network.		
50.18 Explain how Cisco IOS routers achieve convergence in an OSPF network.		
50.19 Configure an OSPF router ID.		
50.20 Configure single-area OSPFv2 in a small, routed IPv4 network.		
50.21 Explain how OSPF uses cost to determine best path.		
50.22 Verify single-area OSPFv2 in a small, routed network.		
50.23 Compare the characteristics and operations of OSPFv2 to OSPFv3.		
50.24 Configure single-area OSPFv3 in a small, routed network.		
50.25 Verify single-area OSPFv3 in a small, routed network.		
51.0 Configure ACLs. – The student will be able to:		
51.01 Explain how ACLs are used to filter traffic.		
51.02 Compare standard and extended IPv4 ACLs.		
51.03 Explain how ACLs use wildcard masks.		
51.04 Explain the guidelines for creating ACLs.		
51.05 Explain the guidelines for placement of ACLs.		
51.06 Configure standard IPv4 ACLs to filter traffic according to networking requirements.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
51.07 Modify a standard IPv4 ACL using sequence numbers.		
51.08 Configure a standard ACL to secure vty access.		
52.0 Configure DHCPv4. – The student will be able to:		
52.01 Describe the operation of DHCPv4 in a small-to-medium-sized business network.		
52.02 Configure a router as a DHCPv4 server.		
52.03 Configure a router as a DHCPv4 client.		
52.04 Troubleshoot a DHCP configuration for IPv4 in a switched network.		
52.05 Explain the operation of DHCPv6.		
52.06 Configure a stateless DHCPv6 for a small-to-medium-sized business.		
52.07 Configure a stateful DHCPv6 for a small-to-medium-sized business.		
52.08 Troubleshoot a DHCP configuration for IPv6 in a switched network.		
53.0 Configure NAT. – The student will be able to:		
53.01 Describe NAT characteristics.		
53.02 Describe the benefits and drawbacks of NAT.		
53.03 Configure static NAT using the CLI.		
53.04 Configure dynamic NAT using the CLI.		
53.05 Configure PAT using the CLI.		
53.06 Configure port forwarding using the CLI.		
53.07 Configure NAT64.		
53.08 Use show commands to verify NAT operation.		

Florida Department of Education
Student Performance Standards

Course Title: **CSIT Cyber Security Essentials**
Course Number: **9001250**
Course Credit: **1**

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
54.0	Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends. – The student will be able to:		
54.01	Describe the history of cybersecurity, including the evolution of a hacker culture.		
54.02	Discuss the trends and national initiatives related to cybersecurity.		
54.03	Distinguish between information assurance and cybersecurity.		
54.04	Describe the concepts of confidentiality as it relates to user and data impact.		
54.05	Explain authentication and the concept of non-repudiation.		
54.06	Describe the concept of “Hacking - The Human Element” and elaborate on its implications to cybersecurity.		
55.0	Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:		
55.01	Identify and understand different viruses.		
55.02	Identify and understand different Trojan Horses.		
55.03	Identify and understand different Logic Bombs.		
55.04	Identify and understand different Worms, Spyware, Adware & RootKit.		
56.0	Recognize and be able to differentiate and explain the following access control models. – The student will be able to:		
56.01	Recognize and define MAC (Mandatory Access Control).		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	56.02 Recognize and define DAC (Discretionary Access Control).		
	56.03 Recognize and define RBAC (Role Based Access Control).		
57.0	Recognize and be able to differentiate and explain the following methods of authentication. – The student will be able to:		
	57.01 Identify and define Kerberos.		
	57.02 Identify and define Certificates.		
	57.03 Identify and define Username/Password.		
	57.04 Identify and define Identify and define Tokens.		
	57.05 Identify and define Multi-factor.		
	57.06 Identify and define Mutual.		
	57.07 Identify and define Biometrics.		
58.0	Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:		
	58.01 Recognize and define DOS/DDOS (Denial of Service/Distributed Denial of Service).		
	58.02 Recognize and define Back Door.		
	58.03 Recognize and define Spoofing.		
	58.04 Recognize and define Man in the Middle.		
	58.05 Recognize and define Replay.		
	58.06 Recognize and define TCP/IP Hijacking.		
	58.07 Recognize and define Weak Keys.		
	58.08 Recognize and define Mathematical.		
	58.09 Recognize and define Social Engineering.		
	58.10 Recognize and define Birthday.		
	58.11 Recognize and define Password Guessing (e.g., Brute Force, Dictionary).		
	58.12 Recognize and define Software Exploitation.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
59.0	Recognize and understand the processes and risks associated with the following security concerns and tasks. – The student will be able to:		
59.01	Identify non-essential services and protocols running on hosts and network devices and know what actions to take to reduce the risks of those services and protocols.		
59.02	Understand the concept of and know how reduce the risks of social engineering.		
59.03	Understand the concept and significance of auditing, logging and system scanning.		
59.04	Identify and be able to differentiate different cryptographic standards and protocols.		
60.0	Recognize and understand the administration of the following types of remote access technologies. – The student will be able to:		
60.01	Recognize and define 802.1x.		
60.02	Recognize and define RADIUS (Remote Authentication Dial-In User Service).		
60.03	Recognize and define TACACS (Terminal Access Controller Access Control System) and TACTCs+.		
60.04	Recognize and define L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).		
60.05	Recognize and define SSH (Secure Shell).		
60.06	Recognize and define IPSEC (Internet Protocol Security).		
60.07	Recognize and define Vulnerabilities.		
61.0	Recognize and understand the administration of the following email security concepts. – The student will be able to:		
61.01	Recognize and define S/MIME (Secure Multipurpose Internet Mail Extensions).		
61.02	Recognize and define PGP (Pretty Good Privacy) like technologies.		
61.03	Recognize and define Vulnerabilities.		
61.04	Recognize and define SPAM.		
61.05	Recognize and define Hoaxes.		
62.0	Recognize and understand the administration of the following Internet security concepts. – The student will be able to:		
62.01	Recognize and define SSL/TLS (Secure Sockets Layer/Transport Layer Security).		
62.02	Recognize and define HTTP/S (Hypertext Transfer Protocol/Hypertext Transfer Protocol over Secure Sockets Layer).		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	62.03 Recognize and define Instant Messaging (i.e., Vulnerabilities, Packet Sniffing, Privacy).		
63.0	Recognize and understand the administration of the following vulnerabilities. – The student will be able to:		
	63.01 Recognize and define Java Script.		
	63.02 Recognize and define ActiveX.		
	63.03 Recognize and define Buffer Overflows.		
	63.04 Recognize and define Cookies.		
	63.05 Recognize and define Signed Applets.		
	63.06 Recognize and define CGI (Common Gateway Interface).		
	63.07 Recognize and define SMTP (Simple Mail Transfer Protocol) Relay.		
64.0	Recognize and understand the administration of the following directory security concepts. – The student will be able to:		
	64.01 Recognize and define SSL/TLS (Secure Sockets Layer/Transport Layer Security).		
	64.02 Recognize and define LDAP (Lightweight Directory Access Protocol).		
65.0	Recognize and understand the administration of the following file transfer protocols and concepts. – The student will be able to:		
	65.01 Recognize and define S/FTP (File Transfer Protocol).		
	65.02 Recognize and define Blind FTP (File Transfer Protocol)/Anonymous.		
	65.03 Recognize and define File Sharing.		
	65.04 Recognize and define Vulnerabilities (i.e., packet sniffing, naming conventions).		
66.0	Recognize and understand the administration of the following wireless technologies and concepts. – The student will be able to:		
	66.01 Recognize and define WTLS (Wireless Transport Layer Security).		
	66.02 Recognize and define 802.11 and 802.11x.		
	66.03 Recognize and define Vulnerabilities (i.e., site surveys).		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
67.0	Compare and contrast the following types of intrusion detection in terms of implementation and configuration. – The student will be able to:		
	67.01 Compare and contrast Network Based – Active and Passive.		
	67.02 Compare and contrast Host Based – Active and Passive.		
	67.03 Compare and contrast Honey Pots.		
	67.04 Compare and contrast Recognize and define Incident Response.		
68.0	Be able to identify and explain the following different kinds of cryptographic algorithms. – The student will be able to:		
	68.01 Recognize and define Hashing.		
	68.02 Recognize and define Symmetric.		
	68.03 Recognize and define Asymmetric.		
69.0	Understand how cryptography and digital signatures address the following security concepts. – The student will be able to:		
	69.01 Recognize and define Confidentiality.		
	69.02 Recognize and define Integrity.		
	69.03 Recognize and define Authentication.		
	69.04 Recognize and define Non-Repudiation.		
	69.05 Recognize and define Access Control.		
70.0	Understand and be able to explain the following concepts of PKI (Public Key Infrastructure). – The student will be able to:		
	70.01 Recognize and define Certificates (e.g., policies, practice statements).		
	70.02 Recognize and define Revocation.		
	70.03 Recognize and define Trust Models.		
71.0	Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles. – The student will be able to:		
	71.01 Understand Centralized versus Decentralized.		
	71.02 Understand Hardware versus software key storage.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
71.03 Understand Private key storage.		
71.04 Understand Escrow.		
71.05 Understand Expiration.		
71.06 Understand Revocation versus suspension (e.g., status checking).		
71.07 Understand Recovery authorization schema (e.g., M-of-N Control - Of M appropriate individuals, N must be present to authorize recovery).		
71.08 Understand Renewal.		
71.09 Understand Destruction.		
71.10 Understand Key Usage.		
71.11 Understand Multiple Key Pairs (Single, Dual).		

Florida Department of Education
Student Performance Standards

Course Title: **CSIT Cyber Security – Physical**
Course Number: **9001260**
Course Credit: **1**

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
72.0	Understand the application of the following concepts of physical security. – The student will be able to:		
72.01	Define Access Control (e.g., physical barriers, biometrics).		
72.02	Define Social Engineering.		
72.03	Defines issues related to Environment (e.g., wireless cells, location, shielding, fire suppression).		
73.0	Understand security concerns and concepts of the following types of devices. – The student will be able to:		
73.01	Recognize, define, and configure Firewalls.		
73.02	Recognize, define, and configure Routers.		
73.03	Recognize, define, and configure Switches.		
73.04	Recognize, define, and configure Wireless.		
73.05	Recognize, define, and configure Modems.		
73.06	Recognize, define, and configure RAS (Remote Access Server).		
73.07	Recognize, define, and configure Telecom/PBX (Private Branch Exchange).		
73.08	Recognize, define, and configure VPN (Virtual Private Network).		
73.09	Recognize, define, and configure IDS (Intrusion Detection System).		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	73.10 Recognize, define, and configure Network Monitoring/Diagnostics.		
	73.11 Recognize, define, and configure Workstations.		
	73.12 Recognize, define, and configure Servers.		
	73.13 Recognize, define, and install Mobile Devices.		
74.0	Understand the security concerns for the following types of media. – The student will be able to:		
	74.01 Recognize, define, and install Coaxial Cable.		
	74.02 Recognize, define, and install UTP/STP (Unshielded Twisted Pair/Shielded Twisted Pair).		
	74.03 Recognize, define, and install Recognize, define, and install Fiber Optic Cable.		
	74.04 Recognize, define, and install Removable Media.		
	74.05 Recognize, define, and install Magnetic Tape.		
	74.06 Recognize, define, and install CD-R (Recordable Compact Disks).		
	74.07 Recognize, define, and install Hard Drives.		
	74.08 Recognize, define, and install Diskettes.		
	74.09 Recognize, define, and install Flashcards.		
	74.10 Recognize, define, and install Smartcards.		
75.0	Explain the following security topologies as they relate to cybersecurity. – The student will be able to:		
	75.01 Recognize and define Security Zones.		
	75.02 Recognize and define DMZ (Demilitarized Zone).		
	75.03 Recognize and define Intranet.		
	75.04 Recognize and define Extranet.		
	75.05 Recognize and define VLANs (Virtual Local Area Network).		
	75.06 Recognize and define NAT (Network Address Translation).		
	75.07 Recognize and define Tunneling.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
76.0	Implement the process of network system hardening within a computer network. – The student will be able to:		
76.01	Install and configure Updates (Firmware & Software).		
76.02	Install and configure Operating System.		
76.03	Complete Configuration.		
76.04	Enabling and Disabling Services and Protocols.		
76.05	Install and configure Access Control Lists.		
77.0	Implement the process of server application/service hardening within a computer network. – The student will be able to:		
77.01	Setup and configure Updates (Hotfixes, Service Packs, Patches).		
77.02	Setup and configure Web Servers.		
77.03	Setup and configure Email Servers.		
77.04	Setup and configure FTP (File Transfer Protocol) Servers.		
77.05	Setup and configure DNS (Domain Name Service) Servers.		
77.06	Setup and configure NNTP (Network News Transfer Protocol) Servers.		
77.07	Setup and configure File/Print Servers.		
77.08	Setup and configure DHCP (Dynamic Host Configuration Protocol) Servers.		
77.09	Setup and configure Data Repositories.		
77.10	Setup and configure Directory Services.		
77.11	Setup and configure Databases.		
78.0	Describe the security implications of the following topics of disaster recovery options. – The student will be able to:		
78.01	Define and use Backups (On-site versus off-site storage).		
78.02	Define Secure Recovery.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	78.03 Define Alternate Sites.		
	78.04 Disaster Recovery Plan.		
79.0	Understand the security implications of the following topics of business continuity. – The student will be able to:		
	79.01 Recognize and define Utilities.		
	79.02 Recognize and define High Availability/Fault Tolerance.		
	79.03 Recognize and define Backups.		
80.0	Demonstrate proficiency in applying the concepts and uses of the following types of policies and procedures. – The student will be able to:		
	80.01 Demonstrate proficiency and understanding of Security Policy.		
	80.02 Demonstrate proficiency and understanding of Acceptable Use.		
	80.03 Demonstrate proficiency and understanding of Due Care.		
	80.04 Demonstrate proficiency and understanding of Privacy.		
	80.05 Demonstrate proficiency and understanding of Separation of Duties.		
	80.06 Demonstrate proficiency and understanding of Need to Know.		
	80.07 Demonstrate proficiency and understanding of Password Management.		
	80.08 Demonstrate proficiency and understanding of SLAs (Service Level Agreements).		
	80.09 Demonstrate proficiency and understanding of Disposal/Destruction.		
	80.10 Demonstrate proficiency and understanding of HR policies related to passwords, privileges, and Code of Ethics in hiring and termination situations.		
	80.11 Demonstrate proficiency and understanding of Incident Response Policy.		
81.0	Explain the following concepts of privilege management. – The student will be able to:		
	81.01 Define User/Group/Role Management.		
	81.02 Define Single Sign-on.		
	81.03 Define Centralized vs. Decentralized.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	81.04 Define Auditing (Privilege, Usage, Escalation).		
	81.05 Define MAC/DAC/RBAC (Mandatory Access Control/Discretionary Access Control/Role Based Access Control).		
82.0	Demonstrate an understanding of the concepts of the following topics of forensics. – The student will be able to:		
	82.01 Identify Chain of Custody.		
	82.02 Identify Preservation of Evidence.		
	82.03 Identify Collection of Evidence.		
83.0	Understand and be able to explain the following concepts of risk identification. – The student will be able to:		
	83.01 Define Asset Identification.		
	83.02 Define Risk Assessment.		
	83.03 Define Threat Identification.		
	83.04 Define Vulnerabilities.		
84.0	Understand the security relevance of the education and training of end users, executives and human resources. – The student will be able to:		
	84.01 Understand importance of Communication.		
	84.02 Understand importance of User Awareness.		
	84.03 Understand importance of Education.		
	84.04 Understand importance of On-line Resources.		
85.0	Explain the following documentation and their role in cybersecurity. – The student will be able to:		
	85.01 Explain Standards and Guidelines.		
	85.02 Explain Systems Architecture.		
	85.03 Explain Change Documentation.		
	85.04 Explain Logs and Inventories.		
	85.05 Explain Classification/Notification Schema.		
	85.06 Explain Retention/Storage.		
	85.07 Explain Destruction.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly

indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Applied Cybersecurity**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9001300
CIP Number	0511100302
Grade Level	9-12, 30, 31
Standard Length	5 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 CYBER TECH 7G INFO TECH 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and cybersecurity-related careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of cybersecurity.

The content includes but is not limited to foundational knowledge and skills in computer and network security, security vulnerabilities, attack mechanisms and techniques, intrusion detection and prevention, cryptographic systems, system hardening, risk identification, incidence response, penetration testing, key management, access control, and recovery. Specialized courses focus on database security, planning and analysis, software, and web security.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points (OCPs). The Digital Information Technology course (8207310) may be used as a substitute for IT Fundamentals (9001310) in this program. To complete this program, students must complete OCP A plus one of the subsequent courses in OCP B.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
	8207310	Digital Information Technology	1 credit		2	PA
		OR				
	9001310	IT Fundamentals	1 credit		2	VO
		AND				
	9001320	Computer and Network Security Fundamentals	1 credit		3	VO
	9001330	Cybersecurity Essentials	1 credit		3	VO
A	9001340	Operational Cybersecurity	1 credit	15-1122	3	VO
	9001350	Cybersecurity Planning & Analysis	1 credit		3	VO
		OR				
	9001360	Database Security	1 credit		3	VO
		OR				
	9001370	Software & Application Security	1 credit		3	VO
		OR				
	9001380	Web Security	1 credit		3	VO
		OR				
B	9001390	Applied Cybersecurity Applications	1 credit	15-1122	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9001310	16/87 18%	34/80 43%	26/83 31%	27/69 39%	32/67 48%	27/70 39%	20/69 29%	32/82 39%	28/66 42%	42/74 57%	31/72 43%
9001320	6/87 7%	4/80 5%	30/83 41%	3/69 4%	7/67 10%	27/70 40%	8/69 12%	31/82 38%	8/66 12%	26/74 35%	2/72 3%
9001330	21/87 24%	37/80 46%	6/83 7%	33/69 48%	32/67 46%	12/70 18%	23/69 33%	10/82 12%	26/66 39%	21/74 28%	37/72 51%
9001340	25/87 29%	34/80 43%	16/83 19%	30/69 43%	30/67 43%	18/70 27%	24/69 35%	17/82 21%	28/66 42%	22/74 30%	29/72 40%
9001350	2/87 2%	19/80 24%	8/83 10%	13/69 19%	9/67 13%	1270 17%	5/69 7%	11/82 13%	13/66 20%	18/74 24%	13/72 18%
9001360	1/87 1%	19/80 24%	8/83 10%	13/69 19%	9/67 13%	12/70 17%	5/69 7%	11/82 13%	13/66 20%	18/74 24%	13/72 18%
9001370	#	#	#	#	#	#	#	#	#	#	#
9001380	#	#	#	#	#	#	#	#	#	#	#
9001390	#	#	#	#	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
9001310	15/67 22%	14/75 19%	14/54 26%	10/46 22%	10/45 22%	4/45 9%	4/45 9%
9001320	14/67 21%	8/75 11%	14/54 26%	10/46 22%	10/45 22%	10/45 22%	10/45 22%
9001330	8/67 12%	14/75 19%	8/54 15%	#	#	#	#
9001340	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
9001350	#	1/75 1%	#	#	#	#	#
9001360	#	#	#	#	#	#	#
9001370	#	#	#	#	#	#	#
9001380	#	#	#	#	#	#	#
9001390	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Cybersecurity.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Cybersecurity.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Cybersecurity.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.

OR

IT Fundamentals Competencies:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Cybersecurity.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Cybersecurity.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Cybersecurity.
04.0 Demonstrate knowledge, skill, and application of computer systems.

05.0 Demonstrate knowledge of different operating systems.
06.0 Develop a familiarity with the information technology industry.
07.0 Develop an awareness of microprocessors and digital computers.
08.0 Develop an awareness of programming languages.
09.0 Develop an awareness of emerging technologies.
10.0 Demonstrate an understanding of the Open Systems Interface (OSI) model.
11.0 Identify computer components and their functions.
12.0 Demonstrate proficiency using the Internet to locate information.
13.0 Demonstrate an understanding of Internet safety and ethics.
14.0 Demonstrate proficiency using Hypertext Markup Language (HTML).
15.0 Demonstrate proficiency in webpage design.
16.0 Demonstrate proficiency using common software applications.
17.0 Perform email activities.
18.0 Demonstrate proficiency in using presentation software and equipment.
19.0 Perform decision-making activities in a multimedia environment.
20.0 Demonstrate language arts knowledge and skills.
21.0 Demonstrate mathematics knowledge and skills.
22.0 Demonstrate science knowledge and skills.

AND

23.0 Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications.
24.0 Describe the national agencies and supporting initiatives involved in cybersecurity.
25.0 Discuss the underlying concepts of terms used in cybersecurity.
26.0 Demonstrate an understanding of basic computer components, their functions, and their operation.
27.0 Demonstrate knowledge of different operating systems.
28.0 Demonstrate an understanding of the Open Systems Interface (OSI) model.
29.0 Describe the services and protocols that operate in the application, transport, network, and link layers of the OSI Model.
30.0 Demonstrate proficiency using computer networks.
31.0 Demonstrate an understanding of basic security concepts.
32.0 Demonstrate an understanding of legal and ethical issues in cybersecurity.
33.0 Demonstrate an understanding of virtualization technology.
34.0 Recognize and understand the administration of the following types of remote access technologies.
35.0 Understand the application of the following concepts of physical security.
36.0 Understand security concerns and concepts of the following types of devices.
37.0 Recognize and be able to differentiate and explain the following access control models.
38.0 Understand the security concerns for the following types of media.
39.0 Explain the following security topologies as they relate to cybersecurity.
40.0 Use oral and written communication skills in creating, expressing and interpreting
41.0 Solve problems using critical thinking skills, creativity and innovation.
42.0 Use information technology tools.
43.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.

44.0 Describe the importance of professional ethics and legal responsibilities.
45.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Applied Cybersecurity.
46.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Applied Cybersecurity.
47.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Applied Cybersecurity.
48.0 Demonstrate an understanding of the technical underpinnings of cybersecurity and its taxonomy, terminology, and challenges.
49.0 Demonstrate an understanding of common information and computer system security vulnerabilities.
50.0 Demonstrate an understanding of common cyber attack mechanisms, their consequences, and motivation for their use.
51.0 Be able to identify and explain the following different kinds of cryptographic algorithms.
52.0 Demonstrate an understanding of the following kinds of steganographic techniques and their use in cybersecurity.
53.0 Understand how cryptography and digital signatures address the following security concepts.
54.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure).
55.0 Demonstrate an understanding of certificates and their role in cybersecurity.
56.0 Demonstrate an understanding of intrusion, the types of intruders, their techniques, and their motivation.
57.0 Demonstrate an understanding of Intrusion Detection Systems (IDS).
58.0 Describe host-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature).
59.0 Describe network-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature).
60.0 Demonstrate an understanding of IDS applications.
61.0 Demonstrate an understanding of port scanning and network traffic monitoring employed as intrusion detection techniques.
62.0 Demonstrate an understanding of firewalls and other means of intrusion prevention.
63.0 Demonstrate an understanding of vulnerabilities unique to virtual computing environments.
64.0 Demonstrate an understanding of social engineering and its implications to cybersecurity.
65.0 Demonstrate an understanding of fundamental security design principles and their role in limiting points of vulnerability.
66.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
67.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
68.0 Explain the importance of employability skill and entrepreneurship skills.
69.0 Demonstrate an understanding of how to configure host systems to guard against cyber intrusion.
70.0 Demonstrate an understanding of authentication methods and strategies.
71.0 Demonstrate an understanding of methods and strategies for controlling access to computer networks.
72.0 Demonstrate an understanding of key network services, their operation, vulnerabilities, and ways in which they may be secured.
73.0 Demonstrate an understanding of the processes involved in hardening a computer system or network.
74.0 Demonstrate an understanding of Public Key Infrastructure (PKI) management functions, key states, and life cycle/transition considerations.
75.0 Demonstrate an understanding of the processes associated with assessing vulnerabilities and risks within an organization.
76.0 Demonstrate an understanding of penetration testing, the types of tests and metrics, testing methodologies, and reporting processes.
77.0 Demonstrate an understanding of the Incident Response Life Cycle and the activities comprising each phase.
78.0 Demonstrate proficiency in cybersecurity risk mitigation planning.
79.0 Demonstrate proficiency in establishing a risk management framework.
80.0 Demonstrate proficiency in creating a corporate security policy.
81.0 Demonstrate proficiency in addressing process risks.

82.0 Demonstrate proficiency in addressing physical security risks.
83.0 Demonstrate proficiency in cybersecurity contingency planning.
84.0 Demonstrate proficiency in cybersecurity disaster recovery planning.
85.0 Demonstrate proficiency in cybersecurity business continuity planning.
86.0 Demonstrate proficiency in the essential elements of forensic analysis.

OR

87.0 Demonstrate an understanding of database design, structure, and operation.
88.0 Demonstrate a fundamental understanding of Structured Query Language (SQL).
89.0 Demonstrate an understanding of database security policies.
90.0 Demonstrate an understanding of database access control, functions, methods, and verification.
91.0 Demonstrate an understanding of database vulnerabilities, attack vectors, and associated countermeasures.
92.0 Demonstrate an understanding of pre- and post-intrusion actions to facilitate database recovery.

OR

93.0 Demonstrate an understanding of software design, structure, and operation.
94.0 Demonstrate a fundamental understanding of common software attack vectors.
95.0 Demonstrate an understanding input syntax validation.
96.0 Demonstrate an understanding of best practices for processing input data to ensure safe and secure program code.
97.0 Demonstrate an understanding of the role of environment variables in the operation of software applications.
98.0 Demonstrate an understanding of program design strategies for inhibiting elevated privilege attacks.

OR

99.0 Demonstrate an understanding of the primary security services used in Internet and intranet environments.
100.0 Demonstrate a fundamental understanding of the SSL protocol stack and its elements.
101.0 Demonstrate an understanding of IPSec, including its uses, elements, and mechanisms.
102.0 Demonstrate an understanding of S/MIME, including its uses, functions, cryptographic algorithms, and key certificates.
103.0 Demonstrate an understanding of Kerberos and its role in third-part authentication in a distributed network.
104.0 Demonstrate an understanding of identity management and ways in which secure identify information is exchanged across different domains.

OR

105.0 Complete a safety skills inventory.
106.0 Demonstrate acceptable project values.
107.0 Demonstrate the ability to detect and resolve system vulnerabilities.
108.0 Plan, organize, and carry out a penetration testing plan.
109.0 Demonstrate proficiency in conducting forensic analysis.
110.0 Successfully work as a member of a team.

111.0 Manage time according to a plan.
112.0 Keep acceptable records of progress problems and solutions.
113.0 Manage resources.
114.0 Use tools, materials, and processes in an appropriate and safe manner.
115.0 Research content related to the project and document the results.
116.0 Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience.
117.0 Demonstrate competency in the area of expertise related to the Applied Cybersecurity education program previously completed that this project is based upon.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

OR

Florida Department of Education
Student Performance Standards

Course Title: **IT Fundamentals**
Course Number: **9001310**
Course Credit: **1**

Course Description:

This course introduces students to the essential concepts, components, terminology, and knowledge about computers, computer systems, peripherals, and networks.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Cybersecurity.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.2.6	
	01.03 Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
	01.04 Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Cybersecurity.		
	02.01 Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.02 Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards			Correlation to CTE Program Standard #
		capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Cybersecurity.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
04.0 Demonstrate knowledge, skill, and application of computer systems. – The student will be able to:		
04.01 Describe and use current and emerging computer technology and software to perform personal and business related tasks.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
04.02 Describe the types of communications and networking systems used in workplace environments.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
04.03 Locate and use software application reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals.		
04.04 Troubleshoot problems with computer hardware peripherals.	MAFS.K12.MP.1.1	SC.912.N.1.1 SC.912.N.1.4

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
04.05	Describe ethical, privacy, and security issues and problems associated with computers and information systems.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.4.2
04.06	Demonstrate proficiency in using the basic features of GUI browsers.		
05.0	Demonstrate knowledge of different operating systems. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
05.01	Identify the most common computer operating systems.		SC.912.N.1.1-4 SC.912.N.1.1-6
05.02	Describe and use industry accepted file naming conventions, particularly in NTFS and FAT file systems.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
05.03	Demonstrate proficiency with file management tasks (e.g., folder creation, file creation, backup, copy, delete, open, save).		
05.04	Demonstrate a working knowledge of standard file formats.		SC.912.N.1.1-7
05.05	Compare and contrast various operating systems (e.g., DOS, Windows, Mac, and Linux).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4	SC.912.N.1.1-6

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
05.06 Differentiate between different operating systems and applications.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
05.07 Compare and contrast open source and proprietary software.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1-6
05.08 Explain how system utilities are used to maintain computer performance.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4,	SC.912.N.1.6

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
06.0 Develop a familiarity with the information technology industry. – The student will be able to:		
06.01 Explain how information technology impacts the operation and management of business and society.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.4.1
06.02 Identify and describe the various ways of segmenting the IT industry (e.g., hardware vs. software, server vs. client, business vs. entertainment, stable vs. mobile).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
06.03 Describe how digital technologies (social media) are changing both work and personal lifestyles.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4,	SC.912.N.1.5 SC.912.N.1.6 SC.912.N.2.2 SC.912.N.4.2

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
07.0 Develop an awareness of microprocessors and digital computers. – The student will be able to:		
07.01 Describe the evolution of the digital computer.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.1 SC.912.N.2.4
07.02 Explain the general architecture of a microcomputer system.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
07.03 Explain the evolution of microprocessors.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4,	SC.912.N.2.4 SC.912.N.2.5

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
07.04 Explain software hierarchy and its impact on microprocessors.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
07.05 Explain the need for and use of peripherals.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
07.06 Demonstrate proficiency installing and using plug-and-play peripherals.		
07.07 Identify the basic concepts of computer maintenance and upgrades.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
08.0 Develop an awareness of programming languages. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
08.01 Explain the evolution of programming languages.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1-7 SC.912.N.2.4 SC.912.N.3.2 SC.912.L.16.9
08.02 Explain the need for and use of compilers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1-7
08.03 Identify the three types of programming design approaches (e.g., top-down, structured, object-oriented).		SC.912.N.3.5

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
08.04 Compare the various types or classes of programming languages (e.g., compiled, interpretive).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
08.05 Differentiate among source code, machine code, interpreters, and compilers.		
08.06 Characterize the major categories of programming languages and how they are used.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
08.07 Create a model flowchart for a computer program.		SC.912.N.3.5 SC.912.N.1.7
08.08 Describe the stages in the software development life cycle and explain how to successfully implement them.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4	SC.912.N.1.1 SC.912.N.3.5

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
09.0 Develop an awareness of emerging technologies. – The student will be able to:		
09.01 Compare and contrast emerging technologies and describe how they impact business in the global marketplace (e.g., wireless, wireless web, cell phones, portables/handhelds, smart appliances, home networks, peer-to-peer).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.E.5.7 SC.912.L.17.15 SC.912.N.4.2
09.02 Describe social media as an emerging technology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4 SC.912.N.4.2
09.03 Adhere to published best practices for protecting personal identifiable information when using the Internet.		
09.04 Identify trends related to the use of information technology in people's personal and professional lives.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4	SC.912.N.2.4 SC.912.N.4.2

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
09.05 Characterize how the rapid pace of change in information technology impacts our society.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4 SC.912.N.4.2
10.0 Demonstrate an understanding of the Open Systems Interface (OSI) model. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
10.01 Describe the evolution of OSI from its inception to the present and into the future.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4
10.02 Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
10.03 Describe the purpose of the OSI model and each of its layers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.3.5
10.04 Explain specific functions belonging to each OSI model layer.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.3.5
10.05 Understand how two network nodes communicate through the OSI model.		
10.06 Discuss the structure and purpose of data packets and frames.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
10.07 Describe the two types of addressing covered by the OSI model.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
11.0 Identify computer components and their functions. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2; SC.912.P.10.1; 10.2; 10.4; 10.14; 10.15; 10.18
11.01 Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).		SC.912.P.10.4 SC.912.P.10.14
11.02 Use common computer and programming terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.L.3.4, 3.6	
12.0 Demonstrate proficiency using the Internet to locate information. – The student will be able to:		
12.01 Identify and describe web terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
12.02 Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
12.03 Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
12.04 Trace the evolution of the Internet from its inception to the present and into the future.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4
12.05 Demonstrate proficiency using search engines, including Boolean search strategies.		SC.912.N.1.1
12.06 Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).		SC.912.N.1.1
12.07 Compare and contrast the roles of web servers and web browsers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
13.0 Demonstrate an understanding of Internet safety and ethics. – The student will be able to:		
13.01 Describe cyber-bullying and its impact on perpetrators and victims.		SC.912.N.4.1 SC.912.N.4.2
13.02 Differentiate between viruses and malware, specifically their sources, ploys, and impact on personal privacy and computer operation, and ways to avoid infection.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
13.03 Describe risks associated with sexting, related legal issues, social engineering aspects, prevention methods, and reporting of offenses.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
13.04 Describe the risks associated with online gaming and ways to mitigate these risks.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
13.05 Describe the ethics and copyright legalities of downloading music or videos from the Internet.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	13.06 Describe risks associated with social networking sites (e.g., Facebook, MySpace, twitter) and ways to mitigate these risks.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	13.07 Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.		SC.912.N.1.1
14.0	Demonstrate proficiency using Hypertext Markup Language (HTML). – The student will be able to:		
	14.01 Categorize websites according to their purpose.		
	14.02 Describe the types of documents that might be used in a web environment (e.g., HTML, ASP, DHTML, XML, JS, CSS, PHP).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	14.03 Identify elements of a webpage.		
	14.04 Define basic HTML terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
14.05 Critique the aesthetic and functional operation of sample websites.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
14.06 Create storyboards depicting a multi-page website (e.g., linear, hierarchical).		
14.07 Design, edit, and test HTML documents for accuracy and validity.		
14.08 Create and modify webpages using a Graphical User Interface (GUI) editor.		
14.09 Enhance webpages through the addition of images and graphics including animation.		
14.10 Analyze webpage source code developed by others.	MAFS.912.MP.3.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2,	SC.912.N.1.1 SC.912.N.2.5

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
14.11	Create webpages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).		
15.0	Demonstrate proficiency in webpage design. – The student will be able to:		
15.01	Develop an awareness of acceptable webpage design, including index pages in relation to the rest of the website.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.4.1
15.02	Describe and apply color theory as it applies to webpage design (e.g., background, text color).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
15.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).		SC.912.N.1.1
15.04	Use image design software to create and edit images.	MAFS.912.G-CO.1.1	
15.05	Demonstrate proficiency in publishing to the Internet.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
15.06 Explain the need for web-based applications.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.4.1
16.0 Demonstrate proficiency using common software applications. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
16.01 Compare and contrast the appropriate use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, email, presentation, database, scheduling, financial management, Java applet, music).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
16.02 Demonstrate proficiency in the use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, email, presentation, database, scheduling, financial management, Java applet, music).		
17.0 Perform email activities. – The student will be able to:		
17.01 Describe email capabilities and functions.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
17.02 Identify components of an email message.		
17.03 Identify the components of an email address.		
17.04 Identify when to use different email options.		
17.05 Attach a file to an email message.		
17.06 Forward an email message.		
17.07 Use an address book.		
17.08 Reply to an email message.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
17.09 Use the Internet to perform email activities.		
17.10 Identify the appropriate use of email and demonstrate related email etiquette.		
17.11 Identify when to include information from an original email message in a response.		
17.12 Identify common problems associated with widespread use of email.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Demonstrate proficiency in using presentation software and equipment. – The student will be able to:		
18.01 Produce a presentation that includes music, animation, and digital photography and present it using a projection system.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
18.02 Using presentation software, create a multimedia presentation that incorporates shot and edited video, animation, music, narration and adheres to good design principles, use of transitions, and effective message conveyance.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
18.03 Demonstrate knowledge of the roles and responsibilities of a multimedia production team (e.g. project manager, creative or design director, content experts, writers, graphic designers, animators, sound designers, videographer, interface designers/programmers).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	18.04 Collaborate with team members to plan, edit, evaluate, and present a multimedia presentation where individuals on the team function in specific production roles.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1
	18.05 Create a self-running presentation with synchronized audio, convert presentation slides (e.g. PowerPoint) into streaming ASF files for use on the Web.		
19.0	Perform decision-making activities in a multimedia environment. – The student will be able to:		
	19.01 Determine work priorities, the audience, project budgets, project specifications, and the production schedule.		
	19.02 Evaluate and select appropriate software packages and multimedia tools to complete assigned tasks.		SC.912.N.4.2
	19.03 Present and defend design projects.	MAFS.912.MP.3.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1
	19.04 Evaluate criteria for selecting an operating system.	MAFS.912.N-Q 1.3	SC.912.N.1.1
20.0	Demonstrate language arts knowledge and skills. – The student will be able to:		
	20.01 Locate, comprehend and evaluate key elements of oral and written information.		SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	20.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.		
	20.03 Present information formally and informally for specific purposes and audiences.		SC.912.N.1.1
21.0	Demonstrate mathematics knowledge and skills. – The student will be able to:		
	21.01 Demonstrate knowledge of arithmetic operations.	MAFS.912.N-RN.2.3	
	21.02 Analyze and apply data and measurements to solve problems and interpret documents.	MAFS.912.S-IC.2.6 MASF.912.S-ID.2.6	
	21.03 Construct charts/tables/graphs using functions and data.	MASF.912.S-ID.1.1 MASF.912.F-IF.1.1 MASF.912.F-IF.2.4 MASF.912.F-IF.2.5	
22.0	Demonstrate science knowledge and skills. – The student will be able to:		
	22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations.		SC.912.N.1.7
	22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.	MAFS.912.S-IC.2.6	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Computer and Network Security Fundamentals**
Course Number: **9001320**
Course Credit: **1**

Course Description:

This course introduces students to cybersecurity and provides them with essential computer and networking knowledge and skills, particularly those related to cybersecurity.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Cybersecurity.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Cybersecurity.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards			Correlation to CTE Program Standard #
		capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Cybersecurity.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	
23.0 Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications. – The student will be able to:		
23.01 Define cybersecurity.		SC.912.L.14.52
23.02 Describe how information security evolved into cybersecurity and the impact of the Internet on the pace and nature of the evolution.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.N.3.1
23.03 Describe the individual elements that comprise the CIA triad (i.e., Confidentiality, Integrity, Availability).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
23.04 Define and explain the various types of hackers and the role each plays in cybersecurity.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
23.05 Describe various methodologies used by hackers and the basis for their employment.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
24.0 Describe the national agencies and supporting initiatives involved in cybersecurity. – The student will be able to:		
24.01 Describe the role of the National Security Agency.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.14.2
24.02 Describe current trends in cyber attacks and strategies for combating them.	LAFS.910.SL.2.4 LAFS.11112.SL.2.4	SC.912.L.14.52
24.03 Describe the legal implications of computer hacking and other forms of cyber attacks.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.16.10
25.0 Discuss the underlying concepts of terms used in cybersecurity. – The student will be able to:		
25.01 Differentiate between cybersecurity and information assurance.		SC.912.N.1.1
25.02 Define confidentiality and give examples of security breaches.		
25.03 Define integrity and give examples of security breaches.		
25.04 Define authenticity and give examples of security breaches.		
25.05 Define accountability (non-repudiation) and give examples of security breaches.		

CTE Standards and Benchmarks		FS-M/LA	
26.0	Demonstrate an understanding of basic computer components, their functions, and their operation. – The student will be able to:		
26.01	Describe the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).	LAFS.910.SL.2.4 LAFS.1112.SL.24	SC.912.L.14.2
26.02	Demonstrate and understanding of common computer and programming terminology.		
26.03	Explain the physical and logical architecture of a microcomputer system.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.14.13
26.04	Describe the file types used in the operation of a computer.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.N.1.1
26.05	Compare and contrast memory technologies (e.g., RAM, ROM, virtual memory, memory management).		SC.912.L.18.11
27.0	Demonstrate knowledge of different operating systems. – The student will be able to:		
27.01	Compare operating system file naming conventions.		SC.912.L.15.4
27.02	Describe the common elements that comprise the architecture of an operating system (e.g., kernel, file manager, memory manager, device manager, network manager).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.15.4
27.03	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).		
27.04	Demonstrate a working knowledge of standard file formats.		
27.05	Describe the purpose of various operating systems (e.g., Windows, Mac, and Unix/Linux).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.18.1
27.06	Describe the difference between client and network operating systems.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
27.07	Differentiate between different operating systems and applications.		SC.912.L.17.4, SC.912.L.17.7
27.08	Explain the basics of boot sequences, methods and startup utilities.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
27.09	Compare and contrast open source and proprietary software.		
27.10	Describe common system utilities used in performing computer maintenance.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.14.2
28.0	Demonstrate an understanding of the Open Systems Interface (OSI) model. – The student will be able to:		
28.01	Describe the evolution of OSI from its inception to the present and into the future.		SC.912.L.15.1
28.02	Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.17.9
28.03	Describe the purpose of the OSI model and each of its layers.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.17.9

CTE Standards and Benchmarks		FS-M/LA	
	28.04 Explain specific functions belonging to each OSI model layer.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.17.9
	28.05 Understand how two network nodes communicate through the OSI model.		
	28.06 Discuss the structure and purpose of data packets and frames.	LAFS.910.SL.1.1 LAFS.112.SL.1.1	
	28.07 Describe the two types of addressing covered by the OSI model.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
29.0	Describe the services and protocols that operate in the application, transport, network, and link layers of the OSI Model. – The student will be able to:		
	29.01 Describe the services and protocols used in the OSI Application Layer (i.e., DHCP, DNS, FTP, HTTP, SMTP, Telnet, IMAP).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	29.02 Describe the services and protocols used in the OSI Transport Layer (i.e., TCP, TSL/SSL, UDP).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	29.03 Describe the services and protocols used in the OSI Network Layer (i.e., IP, ICMP, IGMP, IPSec).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	29.04 Describe the services and protocols used in the OSI Link Layer (i.e., ARP, OSPF, L2TP, PPP).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
30.0	Demonstrate proficiency using computer networks. – The student will be able to:		
	30.01 Define networking and describe the purpose of a network.		SC.912.L.14.24
	30.02 Describe the conceptual background of digital networks including terminology and basics.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	30.03 Describe various types of networks and the advantages and disadvantages of each (e.g. peer to peer, client/server, mainframe/terminal).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	30.04 Describe the use, advantages, and disadvantages of various network media (e.g. thinnet cable, coaxial), twisted pair (cat 5), fiber optics).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	30.05 Describe the function of various network devices (e.g. hub, switched hub or switch, router bridge, gateway, and access points).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.14.2
	30.06 Describe how network devices are identified (i.e., IP addressing).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.14.2
	30.07 Explain the protocols commonly used in a network environment.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	30.08 Differentiate between public and private IP addresses.		
	30.09 Describe the common ports and corresponding protocols used in a network.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	30.10 Describe the difference between the Internet and intranet.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
	30.11 Compare and contrast IP Version 6 and IP Version 4.		

CTE Standards and Benchmarks		FS-M/LA	
30.12	Compare and contrast the different methods for network connectivity (e.g. broadband, wireless, Bluetooth, cellular).		
30.13	Discuss the differences between Local Area Network (LAN), Wide Area Network (WAN), Metropolitan Area Network (MAN), and Virtual Private Network (VPN).	LAFS.910.SL.1. LAFS.1112.SL.1.1	
31.0	Demonstrate an understanding of basic security concepts. – The student will be able to:		
31.01	Distinguish between vulnerability and a threat.		SC.912.L.14.52
31.02	Discuss the different types of attacks (e.g., active, passive).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	SC.912.L.14.52
31.03	Define security policy and explain its role in cybersecurity.		
31.04	Describe the basic methods of authentication (e.g., password, biometrics, smart cards).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.L.16.5
31.05	Describe the various forms of encryption methodologies (e.g., symmetric, asymmetric, block cipher, stream cipher).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
31.06	Describe hash functions and their role in authentication.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
31.07	Describe various method of access control used in computer security (e.g., policies, Groups, Access Control List (ACL)).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
32.0	Demonstrate an understanding of legal and ethical issues in cybersecurity. – The student will be able to:		
32.01	Define cyber crime and discuss the challenges facing law enforcement.		
32.02	Identify the key legislative acts that impact cybersecurity.		SC.912.L.16.10
32.03	Describe the Federal criminal code related to computers and give examples of cyber crimes and penalties, particularly those involving inappropriate access.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
32.04	Discuss digital forensics and its role in cybersecurity.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	SC.912.L.16.11, SC.912.L.16.12
32.05	Distinguish among the Intellectual Property Rights of trademark, patent, and copyright.		
32.06	Explain digital rights management and the implications of the Digital Millennium Copyright Act.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
32.07	Describe the implications of social media (e.g., MySpace, Facebook, Twitter) on the safeguarding of personal or sensitive information.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
32.08	Describe various safeguards that can be employed to help ensure that sensitive or confidential information is not inadvertently divulged or obtained.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
33.0	Demonstrate an understanding of virtualization technology. – The student will be able to:		
33.01	Define virtual computing.		
33.02	Explain the benefits of virtual computing.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	SC.912.N.3.5

CTE Standards and Benchmarks		FS-M/LA	
33.03	Differentiate between guest and host operating systems.		
33.04	Install desktop virtualization software.		
33.05	Describe the role of the hypervisor.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
33.06	Create and upgrade a virtual machine.		SC.912.N.3.5
33.07	Optimize the performance of a virtual machine.		SC.912.N.3.5
33.08	Preserve the state of a virtual machine.		
33.09	Clone, move and share virtual machines.		SC.912.L.16.12
33.10	Use virtual disks and disk drives.		
33.11	Configure a virtual network.		
33.12	Connect devices to a virtual machine.		
33.13	Enable security settings on a virtual machine.		
34.0	Recognize and understand the administration of the following types of remote access technologies. – The student will be able to:		
34.01	802.1x.		
34.02	VPN (Virtual Private Network).		
34.03	RADIUS (Remote Authentication Dial-In User Service).		
34.04	TACACS (Terminal Access Controller Access Control System).		
34.05	L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).		
34.06	SSH (Secure Shell).		
34.07	IPSEC (Internet Protocol Security).		
34.08	Vulnerabilities.		

CTE Standards and Benchmarks		FS-M/LA	
35.0	Understand the application of the following concepts of physical security. – The student will be able to:		
	35.01 Access Control (e.g., physical barriers, biometrics).		
	35.02 Social Engineering.		
	35.03 Environment (e.g., wireless cells, location, shielding, fire suppression).		
36.0	Understand security concerns and concepts of the following types of devices. – The student will be able to:		
	36.01 Firewalls.		
	36.02 Routers.		
	36.03 Switches.		
	36.04 Wireless.		
	36.05 Modems.		
	36.06 RAS (Remote Access Server).		
	36.07 Telecom/PBX (Private Branch Exchange).		
	36.08 VPN (Virtual Private Network).		
	36.09 IDS (Intrusion Detection System).		
	36.10 Network Monitoring/Diagnostics.		
	36.11 Workstations.		
	36.12 Servers.		
	36.13 Mobile Devices.		
37.0	Recognize and be able to differentiate and explain the following access control models. – The student will be able to:		
	37.01 MAC (Mandatory Access Control).		
	37.02 DAC (Discretionary Access Control).		
	37.03 RBAC (Role Based Access Control).		

CTE Standards and Benchmarks		FS-M/LA	
38.0	Understand the security concerns for the following types of media. – The student will be able to:		
38.01	Coaxial Cable.		
38.02	UTP/STP (Unshielded Twisted Pair / Shielded Twisted Pair).		
38.03	Fiber Optic Cable.		
38.04	Removable Media.		
38.05	Tape.		
38.06	CD-R (Recordable Compact Disks).		
38.07	Hard Drives.		
38.08	Diskettes.		
38.09	Flashcards.		
38.10	Smartcards.		
39.0	Explain the following security topologies as they relate to cybersecurity. – The student will be able to:		
39.01	Security Zones.		
39.02	DMZ (Demilitarized Zone).		
39.03	Intranet.		
39.04	Extranet.		
39.05	VLANs (Virtual Local Area Network).		
39.06	NAT (Network Address Translation).		
39.07	Tunneling.		
40.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
40.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.	LAFS.910.SL.2.4 LAFS.910.W.2.4 LAFS.1112.SL.2.4 LAFS.1112.W.2.4	SC.912.N.1.1
40.02	Locate, organize and reference written information from various sources.	LAFS.910.W.3.8 LAFS.910.SL.2.4 LAFS.1112.W.3.8	SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	
		LAFS.1112.SL.2.4	
	40.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	LAFS.910.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL2.4 LAFS.1112.SL.2.5	SC.912.N.1.1
	40.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.	LAFS.910.SL.1.3 LAFS.1112.SL.1.3	SC.912.N.1.1
	40.05 Apply active listening skills to obtain and clarify information.	LAFS.910.SL.1.3 LAFS.1112.SL.1.3	SC.912.N.1.1
	40.06 Develop and interpret tables and charts to support written and oral communications.	LAFS.910.SL.2.4 LAFS.910.W.2.5 LAFS.1112.SL.2.4 LAFS.1112.W.2.5	SC.912.N.1.1
	40.07 Exhibit public relations skills that aid in achieving customer satisfaction.		SC.912.N.1.1
41.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	41.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	SC.912.N.1.3
	41.02 Employ critical thinking and interpersonal skills to resolve conflicts.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	SC.912.N.1.3
	41.03 Identify and document workplace performance goals and monitor progress toward those goals.	LAFS.910.W.2.4 LAFS.1112.W.2.4	
	41.04 Conduct technical research to gather information necessary for decision-making.	LAFS.910.W.3.8 LAFS.1112.W.3.8	SC.912.N.1.1, SC.912.N.1.2, SC.912.N.1.3, SC.912.N.1.4
42.0	Use information technology tools. – The student will be able to:		
	42.01 Use personal information management (PIM) applications to increase workplace efficiency.		
	42.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
	42.03 Employ computer operations applications to access, create, manage, integrate, and store information.		
	42.04 Employ collaborative/groupware applications to facilitate group work.		

CTE Standards and Benchmarks		FS-M/LA	
43.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
43.01	Describe the nature and types of business organizations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
43.02	Explain the effect of key organizational systems on performance and quality.	LAFS.910.SL.2.4 LAFS.910.W.2.4 LAFS.1112.SL.2.4 LAFS.1112.W.2.4	
43.03	List and describe quality control systems and/or practices common to the workplace.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
43.04	Explain the impact of the global economy on business organizations.	LAFS.910.SL.2.4 LAFS.910.W.2.4 LAFS.1112.SL.2.4 LAFS.1112.W.2.4	SC.912.L.16.10
44.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
44.01	Evaluate and justify decisions based on ethical reasoning.		SC.912.L.16.10
44.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		
44.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	LAFS.910.SL.2.4 LAFS.910.W.2.4 LAFS.1112.SL.2.4 LAFS.1112.W.2.4	
44.04	Interpret and explain written organizational policies and procedures.	LAFS.910.RI.1.2 LAFS.1112.RI.1.2	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Cybersecurity Essentials**
Course Number: **9001330**
Course Credit: **1**

Course Description:

This course provides students with insight into the many variations of vulnerabilities, attack mechanisms, intrusion detection systems, and some methods to mitigate cybersecurity risks, including certificate services and cryptographic systems.

Florida Standards			Correlation to CTE Program Standard #
45.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Applied Cybersecurity.		
45.01	Key Ideas and Details		
	45.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	45.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	45.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
45.02	Craft and Structure		
	45.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	45.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	45.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
45.03	Integration of Knowledge and Ideas		
	45.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	45.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	45.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
45.04	Range of Reading and Level of Text Complexity		
	45.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	45.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
46.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Applied Cybersecurity.		
46.01	Text Types and Purposes		
	46.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	46.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
46.02	Production and Distribution of Writing		
	46.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	46.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	46.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	46.03	Research to Build and Present Knowledge	
	46.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	46.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	46.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	46.04	Range of Writing	
	46.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
47.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Applied Cybersecurity.	
	47.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	47.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	47.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	47.04	Model with mathematics. MAFS.K12.MP.4.1	
	47.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	47.06	Attend to precision. MAFS.K12.MP.6.1	
	47.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
47.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
48.0 Demonstrate an understanding of the technical underpinnings of cybersecurity and its taxonomy, terminology, and challenges. – The student will be able to:		
48.01 Explain the various elements that make up the security taxonomy used by the U.S. Computer Emergency Readiness Team (CERT).		
48.02 Describe the challenges associated with achieving and maintaining computer security.		
48.03 Discuss the range of potential consequences of various forms of security breaches.		
48.04 Describe various defense mechanisms, techniques, and methodologies.		
48.05 Compare and contrast mechanisms employed in passive and active cyber attacks.		
48.06 Describe the difference between an inside and an outside attack.		
48.07 Describe vulnerabilities associated with each element of the CIA Triad.		
48.08 Explain the differences between hardware, software, data, and network assets susceptible to cyber attack.		
48.09 Describe the tools and technologies used in cybersecurity.		
48.10 Define intrusion detection and discuss its role in cybersecurity.		
48.11 Explain what is meant by the term countermeasures.		
48.12 Describe the role recovery plays in cybersecurity.		
49.0 Demonstrate an understanding of common information and computer system security vulnerabilities. – The student will be able to:		
49.01 Describe the basic categories of vulnerabilities associated with cybersecurity (i.e., hardware, software, network, human, physical, and organizational).		
49.02 Describe the ways in which social networks such as Facebook and MySpace are cybersecurity targets.		
49.03 Describe footprinting and explain how it is used to reveal system vulnerabilities.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
49.04	Explain why default values and technical controls are points of vulnerability and describe the hardening efforts being taken by government and industry.		
49.05	Describe the process of port scanning and explain why it is so prevalent in cybersecurity.		
49.06	Describe what is meant by password strength and explain its relationship to vulnerability.		
49.07	Distinguish between a weak and a strong password.		
49.08	Describe some of the ways in which intruders are able to cover their tracks.		
49.09	Describe the circumstances under which a computer system is vulnerable to a denial of service attack.		
50.0	Demonstrate an understanding of common cyber attack mechanisms, their consequences, and motivation for their use. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
50.01	Describe spoofing as an attack mechanism and discuss its consequences and common motivating factors for its use.		
50.02	Describe the introduction of malware or spyware as an attack mechanism and discuss its consequences and common motivating factors for its use.		
50.03	Describe the use of grayware as an attack mechanism and discuss its consequences and common motivating factors for its use.		
50.04	Describe the use of computer viruses or worms as an attack mechanism and discuss its consequences and common motivating factors for its use.		
50.05	Describe Logic Bombs as an attack mechanism and discuss its consequences and common motivating factors for its use.		
50.06	Describe botnet and rootkit as an attack mechanism and discuss its consequences and common motivating factors for its use.		
50.07	Describe the introduction of a Trojan Horse as an attack mechanism and discuss its consequences and common motivating factors for its use.		
50.08	Describe DNS poisoning as an attack mechanism and discuss its consequences and common motivating factors for its use.		
50.09	Describe buffer overflow as an attack mechanism and discuss its consequences and common motivating factors for its use.		
51.0	Be able to identify and explain the following different kinds of cryptographic algorithms. – The student will be able to:		
51.01	Hashing Functions.		
51.02	Symmetric Keys.		
51.03	Asymmetric Keys.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	51.04 Kerberos.		
52.0	Demonstrate an understanding of the following kinds of steganographic techniques and their use in cybersecurity. – The student will be able to:		
	52.01 Network steganographic methods (e.g., VOIP, WLAN).		
	52.02 Digital steganographic methods (e.g., image encryption, audio, mimic functions, video, packet manipulation).		
53.0	Understand how cryptography and digital signatures address the following security concepts. – The student will be able to:		
	53.01 Confidentiality.		
	53.02 Integrity.		
	53.03 Authentication.		
	53.04 Non-Repudiation.		
	53.05 Access Control.		
54.0	Understand and be able to explain the following concepts of PKI (Public Key Infrastructure). – The student will be able to:		
	54.01 Certificates (e.g., policies, practice statements).		
	54.02 Revocation.		
	54.03 Trust Models.		
55.0	Demonstrate an understanding of certificates and their role in cybersecurity. – The student will be able to:		
	55.01 Describe the role of a Certificate Authority (CA).		
	55.02 Describe Registration Authority (RA) and its relevance to security certificates.		
	55.03 Compare and contrast SSL/TSL X.509-compliant certificates with PGP-compliant certificates.		
	55.04 Describe the events that make up the lifecycle of a certificate.		
	55.05 Describe how root certificate distribution works.		
56.0	Demonstrate an understanding of intrusion, the types of intruders, their techniques, and their motivation. – The student will be able to:		
	56.01 Define intrusion.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	56.02 Describe the classes of intruders (i.e., masquerader, misfeasor, clandestine user).		
	56.03 Describe what is meant by a hacker and discuss their role in cybersecurity.		
	56.04 Compare and contrast the “black hat” and “white hat” hacker cultures (i.e., computer criminal versus computer security expert).		
	56.05 Describe various techniques used by hackers to achieve intrusion.		
57.0	Demonstrate an understanding of Intrusion Detection Systems (IDS). – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2; SC.912.P.10.1; 10.2; 10.4; 10.10; 10.14; 10.15; 10.18
	57.01 Describe the three logical components that comprise and IDS (i.e., sensors, analyzers, user interface).		
	57.02 Explain how user behavior relates to the detection of an intruder.		
	57.03 Describe the essential requirements for any IDS.		
58.0	Describe host-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature). – The student will be able to:		
	58.01 Describe anomaly detection, specifically threshold and profile-based approaches.		
	58.02 Describe the types of audit records employed in intrusion detection (i.e., native, detection-specific).		
	58.03 Describe signature detection, specifically rule-based anomaly and penetration identification approaches.		
59.0	Describe network-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature). – The student will be able to:		
	59.01 Describe the primary approach for intrusion detection in a network.		
	59.02 Compare and contrast inline and passive sensors.		
	59.03 Discuss typical placement of sensors in a network-based IDS environment and explain the rationale for each.		
60.0	Demonstrate an understanding of IDS applications. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
	60.01 Describe the operation, typical activities, and outputs of an intrusion detection system.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	60.02 Describe some of the limitations of intrusion detection systems.		
	60.03 Differentiate between an intrusion detection system (passive) and an intrusion prevention (reactive) system.		
	60.04 Compare and contrast several of the intrusion detection systems available on the current market.		
61.0	Demonstrate an understanding of port scanning and network traffic monitoring employed as intrusion detection techniques. – The student will be able to:		
	61.01 Describe the process of monitoring/detecting port scanning attacks and associated patterns.		
	61.02 Explain how the monitoring and analysis of network traffic can be used to detect intrusion.		
62.0	Demonstrate an understanding of firewalls and other means of intrusion prevention. – The student will be able to:		
	62.01 Describe the purpose and limitations of firewalls.		
	62.02 Describe the four types of firewalls (i.e., packet filtering, stateful inspection, application-level gateway, circuit-level gateway).		
	62.03 Describe the use of honeypots as an intrusion prevention technique.		
	62.04 Explain how security policies are used to prevent intruders.		
	62.05 Explain how Access Control Lists (ACLs) are used to prevent intrusion.		
63.0	Demonstrate an understanding of vulnerabilities unique to virtual computing environments. – The student will be able to:		
	63.01 Describe the limitations of traffic monitoring within virtual networks.		
	63.02 Discuss the primary vulnerability of virtual operating systems.		
	63.03 Describe the “hypervisor” and explain its role in securing a virtual environment.		
64.0	Demonstrate an understanding of social engineering and its implications to cybersecurity. – The student will be able to:		
	64.01 Define social engineering and describe its role in cybersecurity.		
	64.02 Discuss common mechanisms that constitute social engineering (e.g., phishing, baiting, quid pro quo, pretexting).		
	64.03 Describe the variety of attacks targeting the human element.		
	64.04 Describe countermeasures that can be used to counter social engineering attacks.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
65.0	Demonstrate an understanding of fundamental security design principles and their role in limiting points of vulnerability. – The student will be able to:		
65.01	Discuss the three over-arching security design principles (i.e., only necessary, simple, ease of use).		
65.02	Describe the principle of least privilege as it relates to computer security.		
65.03	Describe the principle of separation of duties as it relates to computer security.		
65.04	Describe the principle of defense in depth as it relates to computer security.		
65.05	Describe the principle of fail secure or fail safe as it relates to computer security.		
65.06	Describe the principle of economy of mechanism as it relates to computer security.		
65.07	Describe the principle of complete mediation as it relates to computer security.		
65.08	Describe the principle of open design as it relates to computer security.		
65.09	Describe the principle of least common mechanism as it relates to computer security.		
65.10	Describe the principle of psychological acceptability as it relates to computer security.		
65.11	Describe the principle of leveraging existing components as it relates to computer security.		
65.12	Describe the principle of weakest link as it relates to computer security.		
65.13	Describe the principle of single point of failure as it relates to computer security.		
66.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
66.01	Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		
66.02	Explain emergency procedures to follow in response to workplace accidents.		
66.03	Create a disaster and/or emergency response plan.		
67.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
67.01	Employ leadership skills to accomplish organizational goals and objectives.		
67.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	67.03 Conduct and participate in meetings to accomplish work tasks.		
	67.04 Employ mentoring skills to inspire and teach others.		
68.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
	68.01 Identify and demonstrate positive work behaviors needed to be employable.		
	68.02 Develop personal career plan that includes goals, objectives, and strategies.		
	68.03 Examine licensing, certification, and industry credentialing requirements.		
	68.04 Maintain a career portfolio to document knowledge, skills, and experience.		
	68.05 Evaluate and compare employment opportunities that match career goals.		
	68.06 Identify and exhibit traits for retaining employment.		
	68.07 Identify opportunities and research requirements for career advancement.		
	68.08 Research the benefits of ongoing professional development.		
	68.09 Examine and describe entrepreneurship opportunities as a career planning option.		

Florida Department of Education
Student Performance Standards

Course Title: **Operational Cybersecurity**
Course Number: **9001340**
Course Credit: **1**

Course Description:

This course provides students with insight into the many ways in which computer systems can be secured, countermeasures implemented, and risk assessment performed.

Florida Standards			Correlation to CTE Program Standard #
45.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Applied Cybersecurity.		
45.01	Key Ideas and Details		
	45.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	45.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	45.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
45.02	Craft and Structure		
	45.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	45.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	45.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
45.03	Integration of Knowledge and Ideas		
	45.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	45.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	45.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
45.04	Range of Reading and Level of Text Complexity		
	45.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	45.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
46.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Applied Cybersecurity.		
46.01	Text Types and Purposes		
	46.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	46.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
46.02	Production and Distribution of Writing		
	46.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	46.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	46.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	46.03	Research to Build and Present Knowledge	
	46.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	46.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	46.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	46.04	Range of Writing	
	46.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
47.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Applied Cybersecurity.	
	47.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	47.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	47.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	47.04	Model with mathematics. MAFS.K12.MP.4.1	
	47.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	47.06	Attend to precision. MAFS.K12.MP.6.1	
	47.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
47.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
69.0	Demonstrate an understanding of how to configure host systems to guard against cyber intrusion. – The student will be able to:		
69.01	Describe the security features and options available for configuring network routers to prevent intrusion.		
69.02	Describe the various types of firewalls (i.e., packet filtering, stateful, application-level gateway, circuit-level gateway) and how each can be used to prevent intrusion.		
69.03	Explain the configuration and operation of a Demilitarized Zone (DMZ) host, including the key services contained within the zone.		
69.04	Describe the role of security zones, content filters, subnets, and trusted zones in configuring a network infrastructure.		
70.0	Demonstrate an understanding of authentication methods and strategies. – The student will be able to:		SC.912.L.14.14; 14.15; 14.50; 16.10; SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
70.01	Describe the strengths, vulnerabilities, and countermeasures related to the use of passwords for authentication.		
70.02	Describe ways in which passwords are compromised and techniques/models for strengthening.		
70.03	Explain token authentication methods (e.g., memory cards, smart cards) and limitations.		
70.04	Discuss the use of biometrics (i.e., facial recognition, fingerprint, hand geometry, retinal pattern, iris, signature, voice) as an authentication strategy, including its advantages, limitations, vulnerabilities, and countermeasures.		
70.05	Describe the challenges associated with remote user authentication, including unique vulnerabilities and corresponding and effective countermeasures.		
71.0	Demonstrate an understanding of methods and strategies for controlling access to computer networks. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3; 1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; N.4.2
71.01	Compare and contrast the three primary categories of access control (i.e.,		

CTE Standards and Benchmarks			FS-M/LA	NGSSS-Sci
		discretionary, mandatory, role-based).		
	71.02	Describe the underlying principles of authorization as an access control mechanism applicable to individuals, system services, subjects, and objects.		
	71.03	Discuss the key features of an access control system (i.e., reliable input, granularity, least privilege, separation of duty, open/close policies, conflict resolution, administration).		
	71.04	Describe the three elements of access control (i.e., subject, object, right).		
	71.05	Describe access rights (i.e., read, write, execute, delete, create, search) and their use in establishing individual and group access control policies.		
	71.06	Compare and contrast the use, operation, and limitations of Access Control Matrix (ACM), Access Control Lists (ACLs), and Capability Tickets in a network environment.		
	71.07	Describe the UNIX file access control schema.		
	71.08	Explain the relationship between security policies and access control.		
	71.09	Describe the use and conceptual operation of formal security policy models (e.g., Bell-La Padula (BLP), Chinese Wall Model (CWM), Harrison Ruzzo Ullman (HRU)).		
	71.10	Describe the use, strengths, and vulnerabilities of group policies in access control and strategies for ensuring safety.		
	71.11	Describe the key entities, relationships, and functions that comprise Role-Based Access Control (RBAC), including privilege management considerations.		
72.0		Demonstrate an understanding of key network services, their operation, vulnerabilities, and ways in which they may be secured. – The student will be able to:		
	72.01	Describe the operation of Dynamic Host Configuration Protocol (DHCP), its vulnerabilities, typical cyber attacks, and potential countermeasure strategies.		
	72.02	Describe the operation of the Domain Name System (DNS) service, its role in a network environment, its vulnerabilities, typical cyber attacks, and potential countermeasure strategies.		
	72.03	Describe the operation of the Simple Mail Transport Protocol (SMTP), its role in a network environment, its vulnerabilities, typical cyber attacks, and potential countermeasure strategies.		
	72.04	Describe the operation of the File Transfer Protocol (FTP) and Telnet, their role in a network environment, their vulnerabilities, typical cyber attacks, and potential countermeasure strategies.		
73.0		Demonstrate an understanding of the processes involved in hardening a computer system or network. – The student will be able to:		
	73.01	Describe hardening and some of the general approaches for securing a computer network.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
73.02	Describe and apply the process by which a web server is hardened against their typical cyber attacks.		
73.03	Describe and apply the process by which a mail server is hardened against their typical cyber attacks.		
73.04	Describe and apply the process by which a FTP server is hardened against their typical cyber attacks.		
73.05	Describe and apply the process by which a file/print server is hardened against their typical cyber attacks.		
73.06	Describe and apply the process by which data repositories are hardened against their typical cyber attacks.		
73.07	Describe and apply the process by which Directory Services is hardened against their typical cyber attacks.		
73.08	Describe and apply the process by which various network appliances are hardened against their typical cyber attacks.		
74.0	Demonstrate an understanding of Public Key Infrastructure (PKI) management functions, key states, and life cycle/transition considerations. – The student will be able to:		
74.01	Compare and contrast the forms, limitations, and vulnerabilities associated with centralized and decentralized key management schemas, including the PKI web of trust model.		
74.02	Describe key escrow, its role in key management, its advantages, and its risks.		
74.03	Differentiate between key backup and key escrow.		
74.04	Explain the role of a key's expiration date, its implications on the key's validity, and its relationship to deactivation.		
74.05	Describe the circumstances under which a key might be revoked, who has authority to revoke a key, and how revocation is communicated.		
74.06	Compare and contrast key suspension and key revocation.		
74.07	Describe ways in which key recovery might be achieved, who is authorized to recover keys, and associated vulnerabilities to attack.		
74.08	Compare and contrast key renewal and key replacement, who is authorized to initiate renewal or replacement, and associated vulnerabilities to attack.		
74.09	Describe the circumstances under which a key might be destroyed, the considerations prior to destruction, and associated vulnerabilities to compromise or attack.		
75.0	Demonstrate an understanding of the processes associated with assessing vulnerabilities and risks within an organization. – The student will be able to:		
75.01	Describe the process of asset identification relative to risk assessment and the considerations or criteria used in identifying assets requiring protection.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
75.02	Describe the process of threat identification, including identifying the types of threats, asset vulnerabilities, and threat sources.		
75.03	Describe the process of risk assessment, including determination of attack probability, attack consequences, and assignment of risk priorities.		
75.04	Evaluate an existing security posture and identify gaps and vulnerabilities in security.		
76.0	Demonstrate an understanding of penetration testing, the types of tests and metrics, testing methodologies, and reporting processes. – The student will be able to:		
76.01	Describe the types of penetration tests (i.e., human, physical, wireless, data networks, telecommunications), the goals of each type, the metrics tested, and the value of their results.		
76.02	Compare and contrast the processes of black box versus white box penetration testing, including their characteristics, limitations, and appropriateness.		
76.03	Define attack vector and explain its relationship and importance to penetration testing.		
76.04	Describe common testing methodologies and standards used in penetration testing.		
76.05	Describe the salient points, structure, detail, and documentation typically addressed in reporting and debriefing the results of penetration testing.		
76.06	Detect malicious and abnormal activities through logs, intrusion detection systems, and other utilities and appliances.		
76.07	Reproduce methods that intruders use to gain unauthorized access to a network system for purposes of compromising information assets.		
76.08	Deploy proprietary and/or open source tools to test known technical vulnerabilities in networked systems.		
76.09	Determine which vulnerabilities are exploitable and estimate the risk and impact of potential exploitations.		
76.10	Recommend appropriate mitigation procedures against discovered vulnerabilities and security gaps.		
76.11	Model the ethics of a licensed Penetration Tester or Computer Security Specialist.		
77.0	Demonstrate an understanding of the Incident Response Life Cycle and the activities comprising each phase. – The student will be able to:		
77.01	Describe the activities that make up the Preparation Phase of the Incident Response Life Cycle, including identification of useful tools and resources.		
77.02	Describe the activities that make up the Detection and Analysis Phase of the Incident Response Life Cycle, including identification of indication sources, analysis of resulting signs of an intrusion event, documentation, and notification of the incident.		
77.03	Describe the factors to consider when prioritizing an incident.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
77.04	Describe the activities that make up the Containment, Eradication, and Recovery Phase of the Incident Response Life Cycle, including selecting a containment strategy, collecting and preserving evidence for forensic analysis, identifying the attacker, re-securing the system, and system restoration.		
77.05	Describe the activities that make up the Post Incident Activity Phase of the Incident Response Life Cycle, including identification of lessons learned and evidence retention.		

Florida Department of Education
Student Performance Standards

Course Title: **Cybersecurity Planning & Analysis**
Course Number: **9001350**
Course Credit: **1**

Course Description:

This course focuses on the mitigation planning, disaster recovery, business continuity planning, and forensic analysis associated with securing computer environments. Many of the standards covered in this framework are based on or aligned with guidelines published by the Computer Security Division of the National Institute of Standards and Technology (NIST).

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
78.0	Demonstrate proficiency in cybersecurity risk mitigation planning. – The student will be able to:		
78.01	Describe the major activities and security controls that are implemented as part of a sound risk management program.		
78.02	Discuss the rationale for executive sponsorship and delineated management responsibilities in successfully implementing a risk management program.		
79.0	Demonstrate proficiency in establishing a risk management framework. – The student will be able to:		
79.01	Describe the importance of creating a system definition for use in assessing vulnerabilities and risks.		
79.02	Describe the major elements of a system definition.		
79.03	Differentiate among critical assets, cyber assets, and critical cyber assets.		
79.04	Explain why cyber assets are classified as public, restricted, confidential, or private and why this plays a role in creating a risk management framework.		
79.05	Compare and contrast the classes of cyber assets (i.e., public, restricted, confidential, private) and give examples of each.		
79.06	Create a system definition that identifies all cyber assets, their class, and their risk category (e.g., critical).		
79.07	Describe an Electronic Security Perimeter (ESP) and discuss its role in formulating a risk management framework.		

CTE Standards and Benchmarks			FS-M/LA	NGSSS-Sci
79.08	Describe the process and goals of a vulnerability assessment of ESP access points.			
79.09	Define risk level and explain the variabilities of its components.			
79.10	Describe ways in which system vulnerability may be ranked according to impact (e.g., safety, outage, privacy, monetary).			
79.11	Describe some of the security controls (e.g., access control, training, audit, configuration, maintenance) that come into play when determining the appropriate risk mitigation strategy.			
79.12	Compare and contrast a top-down and a bottoms-up analysis approach for identifying and mitigating risks.			
79.13	Describe the range of testing/evaluation and associated tools used to monitor mitigation control effectiveness.			
79.14	Create a risk management framework.			
80.0	Demonstrate proficiency in creating a corporate security policy. – The student will be able to:			
80.01	Describe the best practices and security controls that typify a sound corporate security policy.			
80.02	Discuss the elements of a corporate security policy, including policy management, personnel and training, critical asset management, ESP, physical security, incident reporting and response, disaster recovery and business continuity plans.			
80.03	Describe the need for specific implementation and enforcement processes as part of a corporate security policy.			
80.04	Explain the controls required for addressing personnel risks in a corporate security policy (e.g., training, hiring due diligence, enforcement of “least privilege,” access revocation).			
81.0	Demonstrate proficiency in addressing process risks. – The student will be able to:			
81.01	Describe the best practices and security controls typically implemented for assessing and mitigating operational risks, including.			
	81.01.1	Periodic risk assessment.		
	81.01.2	Enforce access control, monitoring, and logging.		
	81.01.3	Perform disposal/redeployment of assets.		
	81.01.4	Enforce change control and configuration management.		
	81.01.5	Conduct vulnerability assessments.		
	81.01.6	Control, Monitor, and log all access to assets.		

CTE Standards and Benchmarks			FS-M/LA	NGSSS-Sci
	81.01.7	Configuration and maintenance.		
	81.01.8	Ensure incident handling processes.		
	81.01.9	Provide for contingency planning.		
81.02	Create an organized mitigation table that identifies operational or process risks, the potential impact of the risk, and specific actions required to mitigate the risk.			
82.0	Demonstrate proficiency in addressing physical security risks. – The student will be able to:		MAFS.912; S-IC.1.2	SC.912.N.1.1; 1.2; 1.3; 1.4;1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
82.01	Describe the best practices and security controls that ensure good physical security of critical infrastructure and assets.			
82.02	Discuss the resulting potential for compromise once physical security is breached.			
82.03	Create an organized mitigation table that identifies physical security risks, the potential impact of the risk, and specific actions required to mitigate the risk.			
83.0	Demonstrate proficiency in cybersecurity contingency planning. – The student will be able to:			
83.01	Define resiliency and its relationship to contingency planning.			
83.02	Describe the purpose and scope of an Information Systems Contingency Plan (ISCP).			
83.03	Identify the five main components of a contingency plan (i.e., Supporting Information, Activation and Notification, Recovery, Reconstitution, Appendices).			
83.04	Describe the contingency planning process and the rationale for each step in the process.			
83.05	Explain the three step process for conducting a business impact analysis (i.e., determine recovery criticality, identify resource requirements, identify recovery priorities).			
83.06	Compare and contrast Maximum Tolerable Downtime (MTD), Recovery Time Objective (RTO), and Recovery Point Objective (RPO).			
83.07	Discuss the criteria typically used to activate the contingency plan.			
83.08	Discuss the role of backup and recovery considerations in contingency planning.			
83.09	Create a contingency plan that includes roles and responsibilities, a business impact analysis with contingency strategies/solutions, outage assessment, resource recovery priorities, backup and recovery strategies, and testing/training considerations.			
84.0	Demonstrate proficiency in cybersecurity disaster recovery planning. – The student will be able to:			
84.01	Describe the purpose and scope of a cybersecurity disaster recovery plan.			

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	84.02 Describe various recovery strategies according to their appropriateness.		
	84.03 Explain the key considerations when formalizing a disaster recovery plan.		
	84.04 Discuss the role of data collection relative to disaster recovery.		
	84.05 Identify the types, purposes, and role of documentation during disaster recovery.		
	84.06 Discuss the role of testing in a disaster recovery plan.		
85.0	Demonstrate proficiency in cybersecurity business continuity planning. – The student will be able to:		
	85.01 Describe the purpose and scope of a cybersecurity business continuity plan.		
	85.02 Explain the concept of fault tolerance and discuss its role in business continuity planning.		
	85.03 Identify and use various utilities employed for the purpose of business continuity.		
	85.04 Describe the role of backups for ensuring business continuity.		
86.0	Demonstrate proficiency in the essential elements of forensic analysis. – The student will be able to:		
	86.01 Describe the four phases of forensic analysis and discuss the activities performed in each phase.		
	86.02 Describe the forensic and evidentiary considerations when determining containment.		
	86.03 Describe the types and sources of data collected for forensic analysis.		
	86.04 Explain the various forms of data and associated collection/retrieval tools for the application transport, IP, and link layers.		
	86.05 Explain the processes by which data is collected for analysis.		
	86.06 Describe the role of system event logs in data collection.		
	86.07 Describe the role of the process log in data collection.		
	86.08 Describe the processes associated with preserving evidence collected for forensic purposes.		
	86.09 Describe how the chain of custody can be maintained for evidence collected during a forensic analysis effort.		

Florida Department of Education
Student Performance Standards

Course Title: **Database Security**
Course Number: **9001360**
Course Credit: **1**

Course Description:

This course focuses on strategies employed to mitigate data compromise, including design, access, and deployment of databases.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
87.0	Demonstrate an understanding of database design, structure, and operation. – The student will be able to:		SC.912.N.1.1; 1.2; 1.3;1.4; 1.5; 1.6; 1.7; 2.2; 2.4; 2.5; 3.1; 3.2; 3.5; 4.1; 4.2
87.01	Describe a relational database and its key elements.		
87.02	Describe the Entity Relationship Model (ERM) and relate how it is a factor in database security.		
87.03	Describe the process of normalization and explain its role in database security.		
87.04	Differentiate between one-to-many, many-to-many and one-to-one relationships.		
87.05	Define referential integrity and describe its implications on database security.		
87.06	Discuss the role of authentication in database security.		
88.0	Demonstrate a fundamental understanding of Structured Query Language (SQL). – The student will be able to:		
88.01	List the capabilities of SQL SELECT statements.		
88.02	Execute basic SQL statements, including SELECT, INSERT, and UPDATE.		
88.03	Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
88.04	Use column aliases to rename columns in the query result.		
88.05	Use SQL to display the structure of a table.		
88.06	Apply SQL syntax to restrict the rows returned from a query.		
88.07	Demonstrate application of the WHERE clause syntax.		
88.08	Apply the proper comparison operator to return a desired result.		
88.09	Create, drop, rename and truncate tables using SQL.		
88.10	Create and remove an index using a SQL statement.		
88.11	Create or modify users and roles using SQL statements.		
88.12	Use the GRANT and REVOKE SQL statements to control access.		
88.13	Differentiate between Data Definition Language (DDL) and Data Manipulation Language (DML) SQL statements and discuss their respective implications to database security.		
89.0	Demonstrate an understanding of database security policies. – The student will be able to:		
89.01	Explain the role of the Database Management System (DBMS) in maintaining database security.		
89.02	Describe three aspects of system level security related to databases (i.e., user privilege schema, user authentication, operating system level privileges).		
89.03	Describe the mechanisms that control access to and use of the database at the object level.		
89.04	Explain how role-based privilege assignment can be used as a data security model.		
89.05	Compare and contrast the implications of connecting to a database with administrator versus user privileges.		
90.0	Demonstrate an understanding of database access control, functions, methods, and verification. – The student will be able to:		
90.01	Compare and contrast rights and privileges as they relate to database security.		
90.02	Describe the manner in which database user rights and privileges are controlled (e.g., granted, revoked).		
90.03	Describe application access rights and discuss their role in a database security schema.		
90.04	Compare and contrast table, column, and row level security, including VIEW implications.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
90.05	Describe fine-grained access control and its use in database security.		
90.06	Describe the operation of a database firewall and explain its role in a database security schema.		
90.07	Describe how database security policies may be used to trigger security auditing events.		
90.08	Describe the various types of auditing (e.g., statement, privilege, object, fine-grained) and associated records.		
91.0	Demonstrate an understanding of database vulnerabilities, attack vectors, and associated countermeasures. – The student will be able to:		
91.01	Describe the SQL Injection attack vector and explain its potential consequences (e.g., privilege escalation, data compromise, data destruction).		
91.02	Describe database inference as a vulnerability and explain how sensitive information can be compromised inadvertently.		
91.03	Discuss ways in which to prevent or limit database inference at design time and query time.		
91.04	Compare and contrast the various countermeasures and strategies to prevent an SQL injection from being successful.		
91.05	Compare and contrast the ways in which encryption might be applied to a database (i.e., database, fields, records, columns) and discuss the tradeoffs of each.		
92.0	Demonstrate an understanding of pre- and post-intrusion actions to facilitate database recovery. – The student will be able to:		
92.01	Describe the criteria which might be employed to trigger an intrusion or breach alarm.		
92.02	Identify the sources for confirming and tracking intrusion.		
92.03	Describe the tools and methodologies used to determine the scope of data compromise.		
92.04	Assess an intrusion, determine the scope of compromise, and restore compromised data.		
92.05	Describe the appropriate actions related to database recovery during incidence response.		

Florida Department of Education
Student Performance Standards

Course Title: **Software & Application Security**
Course Number: **9001370**
Course Credit: **1**

Course Description:

This course addresses the creation of secure software applications, including identifying the vulnerabilities and mitigation strategies.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
93.0	Demonstrate an understanding of software design, structure, and operation. – The student will be able to:		
93.01	Describe a typical software application and its key elements.		
93.02	Compare and contrast software quality and software security in terms of development time, testing, and implementation.		
93.03	Explain how security can be a software design parameter and discuss the inherent trade-offs during the development life cycle.		
93.04	Describe the common failings in software security (e.g., input handling, inadequate testing, incomplete/incorrect algorithms, memory misuse, holes for privilege escalation).		
94.0	Demonstrate a fundamental understanding of common software attack vectors. – The student will be able to:		
94.01	Describe how buffer overflow attacks can be prevented through input validation and proper interpretation.		
94.02	Describe a command injection attack, how it can occur, and the potential consequences.		
94.03	Describe an SQL injection attack, how it can occur, and the potential consequences.		
94.04	Describe a code injection attack, including PHP remote code injection, how it can occur, and the potential consequences.		
94.05	Describe cross-site scripting attack, how it can occur, and the potential consequences.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
95.0	Demonstrate an understanding input syntax validation. – The student will be able to:		
95.01	Explain the need for validating input syntax to ensure proper input handling.		
95.02	Describe canonicalization and its role in handling alternate encoding schemas.		
95.03	Discuss the risks associated with improper handling of signed or unsigned numeric input (e.g., very large data length versus negative number).		
96.0	Demonstrate an understanding of best practices for processing input data to ensure safe and secure program code. – The student will be able to:		
96.01	Explain why any input processing algorithm must correctly handle all problem variants.		
96.02	Explain why debug or test code should be removed from all production bound software.		
96.03	Describe the need for ensuring that machine instructions correctly implement the intended actions of the high-level language code.		
96.04	Describe the concept of a strongly typed programming language and explain its role in correct data interpretation.		
96.05	Describe memory leak as it pertains to dynamically allocated memory, its causes, and potential consequences (e.g., DOS attack).		
96.06	Describe the race condition associated with shared memory access, its causes, and potential consequences (e.g., DOS attack causing deadlock).		
97.0	Demonstrate an understanding of the role of environment variables in the operation of software applications. – The student will be able to:		
97.01	Describe how the PATH, IFS, and LD_LIBRARY_PATH environment variables can be exploited.		
97.02	Explain how dynamic libraries can be subverted through the use of environment variables and describe the potential consequences (e.g., elevated privileges).		
97.03	Describe the principle of “least privilege” relative to the operation of software applications, particularly as it relates to file/directory ownership management.		
98.0	Demonstrate an understanding of program design strategies for inhibiting elevated privilege attacks. – The student will be able to:		
98.01	Describe a Root/Admin program and explain the development and operational benefits of partitioning the program into smaller modules.		
98.02	Identify the sources for confirming and tracking intrusion.		
98.03	Describe the tools and methodologies used to determine the scope of data compromise.		
98.04	Assess an intrusion, determine the scope of compromise, and restore compromised data.		
98.05	Describe the appropriate actions related to database recovery during incidence response.		

Florida Department of Education
Student Performance Standards

Course Title: **Web Security**
Course Number: **9001380**
Course Credit: **1**

Course Description:

This course addresses the creation of secure websites and authentication applications, including identifying the vulnerabilities and mitigation strategies.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
99.0	Demonstrate an understanding of the primary security services used in Internet and intranet environments. – The student will be able to:		
99.01	Describe Secure Sockets Layer (SSL) security service.		
99.02	Compare and contrast SSL with Transport Layer Security (TLS) as a security service.		
99.03	Describe Internet Protocol Security (IPSec) and discuss its benefits and three functional areas (i.e., authentication, confidentiality, key management).		
99.04	Describe Secure/Multipurpose Internet Mail Extension (S/MIME) and discuss its role in achieving secure Internet-based communications.		
100.0	Demonstrate a fundamental understanding of the SSL protocol stack and its elements. – The student will be able to:		
100.01	Compare and contrast SSL Connection and SSL Session.		
100.02	Describe SSL Record Protocol services and discuss their role in managing SSL exchanges (i.e., message integrity, confidentiality).		
100.03	Describe the operation of the SSL Record Protocol, including the key steps that ensure security (e.g., adding message authentication code, encryption).		
100.04	Explain the role of the SSL Change Cipher Spec Protocol in ensuring secure transactions.		
100.05	Explain the role of the SSL Alert Protocol.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
100.06	Describe the SSL Handshake Protocol and explain the role of each phase of communication (i.e., establish security capability, server authentication/key exchange, client authentication/key exchange, complete secure connection).		
101.0	Demonstrate an understanding of IPSec, including its uses, elements, and mechanisms. – The student will be able to:		
101.01	Compare and contrast IPSec with SSL and TSL.		
101.02	Compare and contrast security services provided under IPv4 and IPv6.		
101.03	Differentiate between the three facilities available under IPSec (i.e., Authentication Header, Encapsulating Security Payload, key exchange).		
101.04	Describe the concept of Security Association (SA) and explain the roles of its three parameters (i.e., Security Parameters Index, IP Destination Address, Security Protocol Identifier).		
101.05	Describe the purpose, structure, and criteria of the Authentication Header (AH).		
101.06	Describe the purpose, structure, and elements of the Encapsulating Security Protocol (ESP).		
101.07	Describe the structure and operation of the key management facility of IPSec.		
102.0	Demonstrate an understanding of S/MIME, including its uses, functions, cryptographic algorithms, and key certificates. – The student will be able to:		
102.01	Describe the role of S/MIME in conducting email communications.		
102.02	Compare and contrast the four new security functions provided by S/MIME (i.e., enveloped data, signed data, clear-signed data, and signed enveloped data).		
102.03	Outline the process of using S/MIME during email processing.		
102.04	Describe the various cryptographic algorithms used by S/MIME and discuss their applicability (i.e., DSS, RSA, SHA-1, MD5, ElGamal, AES, 3DES, HMAC).		
102.05	Describe memory leak as it pertains to dynamically allocated memory, its causes, and potential consequences (e.g., DOS attack).		
102.06	Describe the need for using x.509 v3 public key certificates with S/MIME.		
103.0	Demonstrate an understanding of Kerberos and its role in third-part authentication in a distributed network. – The student will be able to:		
103.01	Compare and contrast the roles and operation of a Kerberos Authentication Server (AS) and a Ticket Granting Server (TGS).		
103.02	Describe a Kerberos realm and the mechanism for inter-realm authentication.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
104.0 Demonstrate an understanding of identity management and ways in which secure identify information is exchanged across different domains. – The student will be able to:		
104.01 Describe the key components of identity management architecture.		
104.02 Describe the concept of identity federation and explain its benefits.		
104.03 Describe the standards used in federated identity management (i.e., XML, SOAP, WS-Security, SAML).		

Florida Department of Education
Student Performance Standards

Course Title: **Applied Cybersecurity Applications**
Course Number: **9001390**
Course Credit: **1**

Course Description:

This is a project-based capstone course to provide Applied Cybersecurity students with the opportunity to apply their skills from both offensive and defensive perspectives. Students work in teams to research, plan, design, create, and configure a virtual network to prevent intrusion. Students will be expected to plan, document, perform, and report on penetration testing of a mock virtual network. This activity may take the form of a Capture the Flag (CTF) event.

The following components should be a part of this course:

Planning Conference

The teacher and all team members must participate in a planning conference. It is critical that all parties involved understand and agree on time schedules, expectations, constraints, advanced learning applications, and evaluation criteria.

Project Criteria

The following criteria shall be met when choosing the Applied Cybersecurity Applications project:

The project must allow experiences that utilize both skills and knowledge directly related to the student's “white hat” career interests in cybersecurity. Activities related to penetration testing should span the various types of tests and attack vectors.

The project must provide opportunities for members to experience a high level of interactivity related to the challenges of learning and applying advanced skills in cybersecurity.

The project must provide a safe, legal, and ethically sound environment with up-to-date facilities and equipment.

Each student must maintain a journal with daily entries, defined by the teacher, such as:

(a) Time spent on the project (log in and log out)
(b) Description of the activity for the period(s)
(c) Materials/equipment/fixtures used
(d) Obstacles/challenges/vulnerabilities identified
(e) Possible solutions/strategies identified

(f) Work/successes accomplished
(g) Solutions/tests attempted
(h) Solutions/tests that failed
(i) Conclusions

Each student will be expected to actively participate in creating their team's network design and penetration testing report. The teacher will create a rubric for communicating report requirements and assessing performance.

All design and penetration testing must be limited to the virtual computing environment provided to students and must be supervised and controlled by the teacher. Access to the virtual environment may be acceptable from off-campus or home computers, but is subject to approval by the teacher.

Supervision

Teacher-coordinators of the Applied Cybersecurity Applications project must monitor student activities and support learning. Students must also be evaluated a minimum of once per grading period by the teacher-coordinator. The evaluation should assess how well the student is progressing toward goals established by the teacher-coordinator. The rubric-based design and report assessment, in combination with the student journal, is a recommended method of student assessment.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
105.0 Complete a safety skills inventory. – The student will be able to:		
105.01 Practice safety procedures while enrolled in this course.		
105.02 Demonstrate an understanding of safety and general policies and procedures.		
106.0 Demonstrate acceptable project values. – The student will be able to:		
106.01 Maintain a positive relationship with peers.		
106.02 Demonstrate adaptive self-management skills.		
106.03 Adhere to industry accepted, legal, and ethical standards of cyber conduct.		
106.04 Rotate through a wide variety of increasingly responsible experiences.		
106.05 Apply basic skills in communications, mathematics, and science appropriate to technological content and learning activities.		
107.0 Demonstrate the ability to detect and resolve system vulnerabilities. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
107.01 Prepare a vulnerability matrix to identify and record weak points, the type of vulnerability, significance of the vulnerability, the priority, and the solution.		
107.02 Determine possible solutions for each vulnerability.		
107.03 Research each detected vulnerability.		
107.04 Document solutions as they are devised.		
107.05 Prepare an alternative for any solution that is not successful.		
107.06 Continue the process until a workable solution is found for each vulnerability.		
108.0 Plan, organize, and carry out a penetration testing plan. – The student will be able to:		
108.01 Determine the scope and attack vectors for the test.		
108.02 Organize the team according to individual strengths.		
108.03 Assign specific tasks within a team.		
108.04 Prioritize the attack vectors and sequence the test.		
108.05 Identify required resources.		
108.06 Carry out the testing plan to successful completion.		
108.07 Create the test report detailing the goals, tests, findings, and results.		
109.0 Demonstrate proficiency in conducting forensic analysis. – The student will be able to:		
109.01 Create security incident handling and response policies.		
109.02 Recover deleted, encrypted, or damaged file information as evidence for prosecution in computer crimes.		
109.03 Deploy proprietary and/or open source tools to identify intruder footprints.		
109.04 Coordinate incident response activities.		
109.05 Prepare proper documentation of chain of custody, including accounting for evidence source, destination, and possession.		
109.06 Preserve forensic integrity of evidence.		
109.07 Model highest moral and ethical standards in conducting digital forensic investigations.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
110.0 Successfully work as a member of a team. – The student will be able to:		
110.01 Accept responsibility for specific tasks in a given situation.		
110.02 Document progress, and provide feedback on work accomplished in a timely manner.		
110.03 Complete assigned tasks in a timely and professional manner.		
110.04 Reassign responsibilities when the need arises.		
110.05 Complete daily tasks as assigned on one's own initiative.		
111.0 Manage time according to a plan. – The student will be able to:		
111.01 Set realistic time frames and schedules.		
111.02 Record time worked in the daily journal.		
111.03 Meet goals and objectives set by the team.		
111.04 Identify individual priorities.		
111.05 Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities as needed.		
112.0 Keep acceptable records of progress problems and solutions. – The student will be able to:		
112.01 Develop a record keeping system in the form of a log book or journal to record daily progress.		
112.02 Use a project journal to identify problem statement		
112.03 Develop a portfolio of work accomplished to include design drawings, research, drawings and plans, storyboards, models, mock-ups and prototypes.		
113.0 Manage resources. – The student will be able to:		
113.01 Identify required resources for each stage of the project plan.		
113.02 Determine the methods needed to acquire needed resources.		
113.03 Demonstrate good judgment in the use of resources.		
113.04 Recycle and reuse resources where appropriate.		
113.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
114.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:		
114.01	Identify the proper tool for a given job.		
114.02	Use tools and machines in a safe manner.		
114.03	Adhere to laboratory or job site safety rules and procedures.		
114.04	Identify the application of processes appropriate to the task at hand.		
114.05	Identify materials appropriate to their application.		
115.0	Research content related to the project and document the results. – The student will be able to:		
115.01	Identify the basic research needed to develop the project plan.		
115.02	Identify available resources for completing background research required in the project plan.		
115.03	Demonstrate the ability to locate resource materials in a library, data base, internet and other research resources.		
115.04	Demonstrate the ability to organize information retrieval.		
115.05	Demonstrate the ability to prepare a topic outline.		
115.06	Write a draft of the design and testing report.		
115.07	Edit and proof the respective report.		
115.08	Prepare an electronically composed report in proper form.		
116.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:		
116.01	Prepare a multi-media presentation on the completed project.		
116.02	Make an oral presentation, using multi-media materials.		
116.03	Review the presentation, and make changes in the delivery method(s) to improve presentation skills.		
117.0	Demonstrate competency in the area of expertise related to the Applied Cybersecurity education program previously completed that this project is based upon. – The student will be able to:		
117.01	Demonstrate a mastery of the content of the selected subject area.		
117.02	Demonstrate the ability to use related technological tools, materials and processes		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	related to the specific program area.		
117.03	Demonstrate the ability to apply the knowledge, experience and skill developed in the previous program completion to the successful completion of this demonstration.		
117.04	Demonstrate the acquisition of additional knowledge, skill and experience in one area of the selected field of study beyond the performance standards of the initial program standards.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Technology Support Services**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9001400
CIP Number	0515120200
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in computer technology support positions in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills.

The content includes but is not limited to practical experiences in the implementation, management, and maintenance of advanced technology user environments.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of [enter number] occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	9001410 Or 8207310	IT Essentials Digital Information Technology	1 credit 1 credit	15-1151	2 2	VO PA
	9001420	Technology Support Services - Client Systems	1 credit		3	VO
	9001430	Technology Support Services - Network Systems	1 credit		3	VO
	9001440	Technology Support Services - Specialized Technologies	1 credit		3	VO

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9001410	6/87 7%	18/80 23%	9/83 11%	15/69 22%	12/67 18%	11/70 16%	9/69 13%	10/82 12%	15/66 23%	16/74 22%	13/72 18%
9001420	27/87 31%	29/80 36%	5/83 6%	26/69 38%	3/67 4%	30/70 43%	27/69 39%	5/82 6%	26/66 39%	5/74 7%	25/72 35%
9001430	21/87 24%	23/80 29%	4/83 5%	21/69 30%	2/67 3%	23/70 33%	21/69 30%	5/82 6%	18/66 27%	4/74 5%	21/72 29%
9001440	3/87 3%	3/80 4%	4/83 5%	2/69 3%	2/67 3%	2/70 3%	2/69 3%	3/82 4%	3/66 5%	3/74 4%	1/72 1%

*** Alignment pending review* *# Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
9001410	25/67 37%	13/75 17%	18/54 33%	11/46 24%	11/45 24%	9/45 20%	9/45 20%
9001420	11/67 16%	16/75 21%	11/54 20%	10/46 22%	9/45 20%	7/45 16%	7/45 16%
9001430	9/67 13%	16/75 21%	9/54 17%	6/46 13%	6/45 13%	7/45 16%	7/45 16%
9001440	1/67 1%	2/75 3%	1/54 2%	3/46 7%	3/45 7%	3/45 7%	3/45 7%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Technology Support Services.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Technology Support Services.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Technology Support Services.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Demonstrate knowledge, skill, and application of computer systems.
19.0 Demonstrate knowledge of different operating systems.
20.0 Develop a familiarity with the information technology industry.
21.0 Develop an awareness of microprocessors and digital computers.
22.0 Develop an awareness of programming languages.
23.0 Develop an awareness of emerging technologies.
24.0 Demonstrate an understanding of the Open Systems Interface (OSI) model.
25.0 Identify computer components and their functions.
26.0 Demonstrate proficiency using the Internet to locate information.
27.0 Demonstrate proficiency using Hypertext Markup Language (HTML).
28.0 Demonstrate proficiency in webpage design.
29.0 Demonstrate proficiency using common software applications.

30.0 Perform email activities.
31.0 Demonstrate proficiency in using presentation software and equipment.
32.0 Perform decision-making activities in a multimedia environment.
33.0 Demonstrate language arts knowledge and skills.
34.0 Demonstrate mathematics knowledge and skills.
35.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Technology Support Services.
36.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Technology Support Services.
37.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Technology Support Services.
38.0 Demonstrate proficiency with personal computer hardware.
39.0 Demonstrate proficiency with installing and configuring client system hardware.
40.0 Demonstrate proficiency in troubleshooting, repair and maintenance of client systems.
41.0 Demonstrate proficiency with client operating systems and software.
42.0 Configure and perform system backup and recovery of a client system.
43.0 Configure a Virtual Hard Disk (VHD) on a client system.
44.0 Demonstrate proficiency with networking.
45.0 Demonstrate an understanding of fundamental computer security.
46.0 Demonstrate proficiency with installing, configuring, and upgrading common client software applications or suites.
47.0 Solve software installation escalations.
48.0 Solve software failure escalations.
49.0 Demonstrate proficiency with technical support operational procedures.
50.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
51.0 Solve problems using critical thinking skills, creativity and innovation.
52.0 Use information technology tools.
53.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
54.0 Describe the importance of professional ethics and legal responsibilities.
55.0 Describe the operation of data networks.
56.0 Differentiate between various network media and topologies.
57.0 Install and configure basic network devices.
58.0 Demonstrate proficiency using basic network tools.
59.0 Demonstrate an understanding of network IP addressing and associated issues.
60.0 Demonstrate an understanding of network management tasks and methodologies.
61.0 Implement a Wireless Local Area Network (WLAN).
62.0 Demonstrate an understanding of network security threats and mitigation techniques.
63.0 Demonstrate proficiency with troubleshooting network operating systems.
64.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
65.0 Explain the importance of employability skill and entrepreneurship skills.
66.0 Configure Full Disk Encryption (FDE) software (e.g., BitLocker, BitLocker To Go).
67.0 Configure intranet tunneling software (e.g., DirectAccess, Barracuda).
68.0 Demonstrate proficiency with Network Mobility (NEMO) basic support protocol.

69.0 Demonstrate proficiency in configuring and maintaining remote connections.
70.0 Perform installation, configuration, and management operations for both client and server disks.
71.0 Monitor system performance.
72.0 Optimize system performance.
73.0 Demonstrate proficiency with troubleshooting specialized network and communications devices.
74.0 Configure and maintain network-based technologies associated with providing web services.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

OR

Florida Department of Education
Student Performance Standards

Course Title: **IT Essentials**
Course Number: **9001410**
Course Credit: **1**

Course Description:

This course introduces students to the essential concepts, components, terminology, and knowledge about computers, computer systems, peripherals, and networks.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Technology Support Services.		
01.01	Key Ideas and Details		
01.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
01.02.1		Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2		Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3		Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Technology Support Services.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly	

Florida Standards			Correlation to CTE Program Standard #
		and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Technology Support Services.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	
	03.08	Look for and express regularity in repeated reasoning.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Demonstrate knowledge, skill, and application of computer systems. – The student will be able to:		
18.01 Describe and use current and emerging computer technology and software to perform personal and business related tasks.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
18.02 Describe the types of communications and networking systems used in workplace environments.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
18.03 Locate and use software application reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.2.4 LAFS.1112.RI.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	MAFS.K12.MP.1.1	
18.04 Troubleshoot problems with computer hardware peripherals.		SC.912.N.1.1 SC.912.N.1.4
18.05 Describe ethical, privacy, and security issues and problems associated with computers and information systems.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.4.2
18.06 Demonstrate proficiency in using the basic features of GUI browsers.		
19.0 Demonstrate knowledge of different operating systems. – The student will be able to:		
19.01 Identify the most common computer operating systems.		
19.02 Describe and use industry accepted file naming conventions, particularly in NTFS and FAT file systems.		
19.03 Demonstrate proficiency with file management tasks (e.g., folder creation, file creation, backup, copy, delete, open, save).		
19.04 Demonstrate a working knowledge of standard file formats.		
19.05 Compare and contrast various operating systems (e.g., DOS, Windows, Mac, and Linux).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
19.06 Differentiate between different operating systems and applications.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
19.07 Compare and contrast open source and proprietary software.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L. 3.4, 3.6 MAFS.912.S-IC.2.6 MAFS.912.A-CED.1.3	
19.08 Explain how system utilities are used to maintain computer performance.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.6
20.0 Develop a familiarity with the information technology industry. – The student will be able to:		
20.01 Explain how information technology impacts the operation and management of business and society.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL. 1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6 MAFS.912.F-IF.2.4	SC.912.N.4.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
20.02 Identify and describe the various ways of segmenting the IT industry (e.g., hardware vs. software, server vs. client, business vs. entertainment, stable vs. mobile).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6 MAFS.912.S-CP.1.1	
20.03 Describe how digital technologies (social media) are changing both work and personal lifestyles.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.5 SC.912.N.1.6 SC.912.N.4.2 SC.912.N.2.2
21.0 Develop an awareness of microprocessors and digital computers. – The student will be able to:		
21.01 Describe the evolution of the digital computer.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
21.02 Explain the general architecture of a microcomputer system.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
21.03 Explain the evolution of microprocessors.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
21.04 Explain software hierarchy and its impact on microprocessors.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
21.05 Explain the need for and use of peripherals.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
21.06 Demonstrate proficiency installing and using plug-and-play peripherals.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
21.07 Identify the basic concepts of computer maintenance and upgrades.		
22.0 Develop an awareness of programming languages. – The student will be able to:		
22.01 Explain the evolution of programming languages.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1-7 SC.912.N.2.4 SC.912.L.16.9 SC.912.N.3.2
22.02 Explain the need for and use of compilers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8	SC.912.N.1.1-7

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
22.03 Identify the three types of programming design approaches (e.g., top-down, structured, object-oriented).		
22.04 Compare the various types or classes of programming languages (e.g., compiled, interpretive).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
22.05 Differentiate among source code, machine code, interpreters, and compilers.		
22.06 Characterize the major categories of programming languages and how they are used.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
22.07 Create a model flowchart for a computer program.		SC.912.N.3.5 SC.912.N.1.7
22.08 Describe the stages in the software development life cycle and explain how to successfully implement them.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4,	SC.912.N.3.5 SC.912.N.1.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
23.0 Develop an awareness of emerging technologies. – The student will be able to:		
23.01 Compare and contrast emerging technologies and describe how they impact business in the global marketplace (e.g., wireless, wireless web, cell phones, portables/handhelds, smart appliances, home networks, peer-to-peer).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W. 1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6 MAFS.912.S-IC.1.1	SC.912.E.5.7 SC.912.L.17.15 SC.912.N.4.2
23.02 Describe social media as an emerging technology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4 SC.912.N.4.2
23.03 Adhere to published best practices for protecting personal identifiable information when using the Internet.		
23.04 Identify trends related to the use of information technology in people's personal and professional lives.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4,	SC.912.N.2.4 SC.912.N.4.2

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
23.05 Characterize how the rapid pace of change in information technology impacts our society.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4 SC.912.N.4.2
24.0 Demonstrate an understanding of the Open Systems Interface (OSI) model. – The student will be able to:		
24.01 Describe the evolution of OSI from its inception to the present and into the future.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4
24.02 Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
24.03 Describe the purpose of the OSI model and each of its layers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.3.5
24.04 Explain specific functions belonging to each OSI model layer.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.3.5
24.05 Understand how two network nodes communicate through the OSI model.		
24.06 Discuss the structure and purpose of data packets and frames.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
24.07 Describe the two types of addressing covered by the OSI model.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
25.0 Identify computer components and their functions. – The student will be able to:		
25.01 Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
25.02 Use common computer and programming terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
26.0 Demonstrate proficiency using the Internet to locate information. – The student will be able to:		
26.01 Identify and describe web terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
26.02 Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
26.03 Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
26.04 Describe and observe Internet/Intranet ethics and copyright laws and regulatory control.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
26.05 Trace the evolution of the Internet from its inception to the present and into the future.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4
26.06 Demonstrate proficiency using search engines, including Boolean search strategies.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1
26.07 Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).		SC.912.N.1.1
26.08 Compare and contrast the roles of web servers and web browsers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
27.0	Demonstrate proficiency using Hypertext Markup Language (HTML). – The student will be able to:		
	27.01 Categorize websites according to their purpose.		
	27.02 Describe the types of documents that might be used in a web environment (e.g., HTML, ASP, DHTML, XML, JS, CSS, PHP).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	27.03 Identify elements of a webpage.		
	27.04 Define basic HTML terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	27.05 Critique the aesthetic and functional operation of sample websites.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6,	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6 MAFS.912.MP.3.1	
27.06	Create storyboards depicting a multi-page website (e.g., linear, hierarchical).		
27.07	Design, edit, and test HTML documents for accuracy and validity.		
27.08	Create and modify webpages using a Graphical User Interface (GUI) editor.		
27.09	Enhance webpages through the addition of images and graphics including animation.		
27.10	Analyze webpage source code developed by others.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6 MAFS.912.MP.3.1	SC.912.N.1.1 SC.912.N.2.5
27.11	Create webpages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).		
28.0	Demonstrate proficiency in webpage design. – The student will be able to:		
28.01	Develop an awareness of acceptable webpage design, including index pages in relation to the rest of the website.		SC.912.N.4.1
28.02	Describe and apply color theory as it applies to webpage design (e.g., background, text color).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4,	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
28.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).		SC.912.N.1.1
28.04	Use image design software to create and edit images.	MAFS.912.G-CO.1.1	
28.05	Demonstrate proficiency in publishing to the Internet.		
28.06	Explain the need for web-based applications.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.4.1
29.0	Demonstrate proficiency using common software applications. – The student will be able to:		
29.01	Compare and contrast the appropriate use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, email, presentation, database, scheduling, financial management, Java applet, music).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
29.02	Demonstrate proficiency in the use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, email, presentation, database, scheduling, financial management, Java applet, music).		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
30.0 Perform email activities. – The student will be able to:		
30.01 Describe email capabilities and functions.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
30.02 Identify components of an email message.		
30.03 Identify the components of an email address.		
30.04 Identify when to use different email options.		
30.05 Attach a file to an email message.		
30.06 Forward an email message.		
30.07 Use an address book.		
30.08 Reply to an email message.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
30.09 Use the Internet to perform email activities.		
30.10 Identify the appropriate use of email and demonstrate related email etiquette.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	30.11 Identify when to include information from an original email message in a response.		
	30.12 Identify common problems associated with widespread use of email.		
31.0	Demonstrate proficiency in using presentation software and equipment. – The student will be able to:		
	31.01 Produce a presentation that includes music, animation, and digital photography and present it using a projection system.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	31.02 Using presentation software, create a multimedia presentation that incorporates shot and edited video, animation, music, narration and adheres to good design principles, use of transitions, and effective message conveyance.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	31.03 Demonstrate knowledge of the roles and responsibilities of a multimedia production team (e.g. project manager, creative or design director, content experts, writers, graphic designers, animators, sound designers, videographer, interface designers/programmers).	LAFS.910.L.3.6 LAFS.1112.L.3.6	
	31.04 Collaborate with team members to plan, edit, evaluate, and present a multimedia presentation where individuals on the team function in specific production roles.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8	SC.912.N.1.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
31.05 Create a self-running presentation with synchronized audio, convert presentation slides (e.g. PowerPoint) into streaming ASF files for use on the Web.		
32.0 Perform decision-making activities in a multimedia environment. – The student will be able to:		
32.01 Determine work priorities, the audience, project budgets, project specifications, and the production schedule.		
32.02 Evaluate and select appropriate software packages and multimedia tools to complete assigned tasks.		SC.912.N.4.2
32.03 Present and defend design projects.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6 MAFS.912.MP.3.1	SC.912.N.1.1
32.04 Evaluate criteria for selecting an operating system.	MAFS.912. N-Q 1.3	SC.912.N.1.1
33.0 Demonstrate language arts knowledge and skills. – The student will be able to:		
33.01 Locate, comprehend and evaluate key elements of oral and written information.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
33.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
33.03 Present information formally and informally for specific purposes and audiences.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1
34.0 Demonstrate mathematics knowledge and skills. – The student will be able to:		
34.01 Demonstrate knowledge of arithmetic operations.	MAFS.912.N-RN.2.3	
34.02 Analyze and apply data and measurements to solve problems and interpret documents.	MAFS.912.S-IC.2.6 MASF.912.S-ID.2.6	
34.03 Construct charts/tables/graphs using functions and data.	MASF.912.S-ID.1.1 MASF.912.F-IF.1.1 MASF.912.F-IF.2.4 MASF.912.F-IF.2.5	

Florida Department of Education
Student Performance Standards

Course Title: **Technology Support Services – Client Systems**
Course Number: **9001420**
Course Credit: **1**

Course Description:

Florida Standards			Correlation to CTE Program Standard #
35.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Technology Support Services.		
35.01	Key Ideas and Details		
	35.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	35.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	35.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
35.02	Craft and Structure		
	35.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	35.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	35.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
35.03	Integration of Knowledge and Ideas		
	35.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in	

Florida Standards			Correlation to CTE Program Standard #
		order to address a question or solve a problem. LAFS.1112.RST.3.7	
	35.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	35.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
35.04	Range of Reading and Level of Text Complexity		
	35.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	35.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
36.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Technology Support Services.		
36.01	Text Types and Purposes		
	36.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	36.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
36.02	Production and Distribution of Writing		
	36.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	36.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	36.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
36.03	Research to Build and Present Knowledge		

Florida Standards			Correlation to CTE Program Standard #
	36.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	36.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	36.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	36.04 Range of Writing		
	36.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
37.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Technology Support Services.		
	37.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
	37.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
	37.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
	37.04 Model with mathematics. MAFS.K12.MP.4.1		
	37.05 Use appropriate tools strategically. MAFS.K12.MP.5.1		
	37.06 Attend to precision. MAFS.K12.MP.6.1		
	37.07 Look for and make use of structure. MAFS.K12.MP.7.1		
	37.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:

FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
38.0 Demonstrate proficiency with personal computer hardware. – The student will be able to:		
38.01 Categorize storage devices and backup media.		
38.02 Explain motherboard components, types and features.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
38.03 Classify power supplies types and characteristics.		
38.04 Explain the purpose and characteristics of CPUs and their features.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
38.05 Explain cooling methods and devices.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
38.06 Compare and contrast memory types, characteristics and their purpose.	MAFS.912.S-CP.1.1	
38.07 Distinguish between the different display devices and their characteristics.	LAFS.910.W.3.7 LAFS.1112.W.3.7	
38.08 Summarize the function and types of adapter cards.	LAFS910.RI.1.2 LAFS1112.RI.1.2	
39.0 Demonstrate proficiency with installing and configuring client system hardware. – The student will be able to:		
39.01 Install, configure and optimize personal computer components.		
39.02 Install, configure, and optimize laptop components.		
39.03 Install, configure, and optimize client system peripherals (e.g., output devices, input devices).		
39.04 Demonstrate proficiency using the following tools:		
39.04.1 Multimeter.		
39.04.2 Power supply tester.		
39.04.3 Specialty hardware / tools.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	39.04.4 Cable testers.		
	39.04.5 Loop back plugs.		
	39.04.6 Anti-static pad and wrist strap.		
	39.04.7 Extension magnet.		
40.0	Demonstrate proficiency in troubleshooting, repair and maintenance of client systems. – The student will be able to:		
	40.01 Explain the troubleshooting theory.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	SC.912.N.3.1
	40.02 Explain and interpret common hardware and operating system symptoms and their causes.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
	40.03 Determine the troubleshooting methods and tools for printers.		SC.912.N.1.1
	40.04 Explain and interpret common laptop issues and determine the appropriate basic troubleshooting method.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
	40.05 Integrate common preventative maintenance techniques.		
	40.06 Analyze system/application logs and other system resources to identify and/or resolve performance issues related to display, disk space, and virtual memory.	LAFS.910.W.3.7 LAFS1112.W.3.7 LAFS.910.RI.1.3 LAFS1112.RI.1.3	
	40.07 Use appropriate client system tools and utilities to diagnose and resolve hardware failure issues, including hard drive sectors, memory, cabling, and BIOS.		SC.912.N.1.1
41.0	Demonstrate proficiency with client operating systems and software. – The student will be able to:		
	41.01 Compare and contrast the different client operating systems and their features.	MAFS.912.S-CP.1.1	
	41.02 Given a scenario, demonstrate proper use of user interfaces.		
	41.03 Explain the process and steps to install and configure a client operating system.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	SC.912.N.1.1 SC.912.N.1.2
	41.04 Explain the basics of boot sequences, methods and startup utilities.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.W.2.4	
	41.05 Perform a clean installation of an operating system.		
	41.06 Perform a version upgrade to an existing operating system, maintaining user profiles, preferences, and historical information.		
42.0	Configure and perform system backup and recovery of a client system. – The student will be able to:		
	42.01 Compare and contrast system backup and system imaging.	MAFS.912.S-CP.1.1	
	42.02 Create a system image file or backup file as appropriate.		
	42.03 Create system restore points.		
	42.04 Configure system images and backup files for automatic update.		
	42.05 Recover a system using either a system image file or backup file.		
43.0	Configure a Virtual Hard Disk (VHD) on a client system. – The student will be able to:		
	43.01 Create, deploy, boot, mount, and update a VHD.		
	43.02 Perform offline updates.		
	43.03 Perform offline servicing.		
44.0	Demonstrate proficiency with networking. – The student will be able to:		
	44.01 Summarize the basics of networking fundamentals, including technologies, devices and protocols.	LAFS.910.RI.1.2 LAFS.1112.RI.1.2	
	44.02 Categorize network cables and connectors and their implementations.		
	44.03 Compare and contrast the different network types.	MAFS.912.S-CP.1.1	
	44.04 Validate client configuration for network connectivity.		
	44.05 Install and configure connectivity for a small local area network using either IPv4 or IPv6.		
	44.06 Set up user accounts for a small local area network.		
	44.07 Configure file and folder access using NTFS permissions and sharing.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
45.0	Demonstrate an understanding of fundamental computer security. – The student will be able to:		
45.01	Explain basic security concepts and technologies, including firewalls, encryption technologies, and authentication.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
45.02	Describe the following security and authentication features and technologies:	LAFS.910.RI.1.1 LAFS1112.RI.1.1	
45.02.1	Wireless encryption.		
45.02.2	Malicious software protection.		
45.02.3	BIOS Security.		
45.02.4	Password management/password complexity.		
45.02.5	Locking workstation.		
45.02.6	Biometrics and smart cards.		
45.03	Discuss the basics of data sensitivity and security, including compliance, classifications, and social engineering.	LAFS.910.SL.1.1 LAFS1112.SL.1.1	
45.04	Install, configure, and launch antivirus software, isolating or removing viruses and malware as needed.		
45.05	Configure a local security policy and associated authentication and authorization rules.		
46.0	Demonstrate proficiency with installing, configuring, and upgrading common client software applications or suites. – The student will be able to:		
46.01	Validate software licensing compliance and system compatibility.	MAFS.912.S-IC.2.6	
46.02	Perform initial installation of a common software application.		
46.03	Perform an upgrade of a common software application.		
46.04	Install and configure an Internet browser.		
46.05	Install software and/or browser add-ins.		
46.06	Resolve configuration issues with newly installed software, to include installation of appropriate drivers and operating files as needed.		
47.0	Solve software installation escalations. – The student will be able to:		
47.01	Verify installation permissions.	MAFS.912.S-IC.2.6	
47.02	Validate local administrator requirement.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	47.03 Determine licensing restrictions.		
	47.04 Validate digital signing.	MAFS.912.S-IC.2.6	
48.0	Solve software failure escalations. – The student will be able to:		
	48.01 Check the appropriate system/application logs.		
	48.02 Check whether the application runs in Safe mode.		
	48.03 Isolate the problem and repair the installation.		
	48.04 Check recently added programs.		
	48.05 Restore or reimage the system.		
49.0	Demonstrate proficiency with technical support operational procedures. – The student will be able to:		
	49.01 Adhere to safety and environmental procedures related to ESD, SMI, RFI, electrical safety, cabling, and physical/environmental.	LAFS.910.RI.1.3 LAFS.1112.RI.1.3	SC.912.N.1.1 SC.912.L.17.15 SC.912.L.17.17
	49.02 Describe the characteristics desired in establishing and maintaining good customer relations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
	49.03 Demonstrate appropriate communication skills and professionalism in customer interactions.	LAFS.910.SL.1.1 LAFS1112.SL.1.1 LAFS.910.SL.2.4 LAFS1112.SL.2.4	
	49.04 Apply call center vocabulary.	LAFS.910.RI.2.4 LAFS1112.RI.2.4	
50.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
	50.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.	LAFS.910.SL.2.4 LAFS.1112.S.L2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
	50.02 Locate, organize and reference written information from various sources.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8	SC.912.N.1.1 SC.912.N.1.4
	50.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	LAFS.910.SL.2.4 LAFS1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	50.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.	LAFS.910.SL.1.3 LAFS.1112.SL.1.3	
	50.05 Apply active listening skills to obtain and clarify information.	LAFS.910.SL.1.3 LAFS.1112.SL.1.3	
	50.06 Develop and interpret tables and charts to support written and oral communications.	LAFS.910.SL.1.3 LAFS.1112.SL.1.3	SC.912.N.1.1
	50.07 Exhibit public relations skills that aid in achieving customer satisfaction.	LAFS.910.SL.2.4 LAFS1112.SL.2.4 LAFS.910.SL.2.5 LAFS.1112.SL.2.5	
51.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	51.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	LAFS.910.SL.1.1 LAFS.112.SL.1.1	SC.912.N.1.3
	51.02 Employ critical thinking and interpersonal skills to resolve conflicts.	LAFS.910.SL.1.1 LAFS.112.SL.1.1	SC.912.N.1.3
	51.03 Identify and document workplace performance goals and monitor progress toward those goals.	LAFS.910.W.2.4 LAFS1112.W.2.4	
	51.04 Conduct technical research to gather information necessary for decision-making.	LAFS.910.W.3.8 LAFS.1112.W.3.8	SC.912.N.1.1
52.0	Use information technology tools. – The student will be able to:		
	52.01 Use personal information management (PIM) applications to increase workplace efficiency.		SC.912.N.1.1
	52.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.		
	52.03 Employ computer operations applications to access, create, manage, integrate, and store information.		
	52.04 Employ collaborative/groupware applications to facilitate group work.		
53.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
	53.01 Describe the nature and types of business organizations.	LAFS.910.RI.1.1 LAFS1112.RI.1.1	
	53.02 Explain the effect of key organizational systems on performance and quality.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
	53.03 List and describe quality control systems and/or practices common to the workplace.	LAFS.910.RI.1.1 LAFS1112.RI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	53.04 Explain the impact of the global economy on business organizations.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
54.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
	54.01 Evaluate and justify decisions based on ethical reasoning.		SC.912.L.16.10
	54.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		SC.912.L.16.10
	54.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	SC.912.L.16.10
	54.04 Interpret and explain written organizational policies and procedures.	LAFS.1112.RI.1.2 LAFS.910.RI.1.2	

Florida Department of Education
Student Performance Standards

Course Title: **Technology Support Services – Network Systems**
Course Number: **9001430**
Course Credit: **1**

Course Description:

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Florida Standards			Correlation to CTE Program Standard #
35.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Technology Support Services.		
	35.01 Key Ideas and Details		
	35.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	35.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	35.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	35.02 Craft and Structure		
	35.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	35.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	35.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
35.03	Integration of Knowledge and Ideas		
	35.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	35.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	35.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
35.04	Range of Reading and Level of Text Complexity		
	35.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	35.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
36.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Technology Support Services.		
36.01	Text Types and Purposes		
	36.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	36.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
36.02	Production and Distribution of Writing		
	36.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	36.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	36.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	36.03	Research to Build and Present Knowledge	
	36.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	36.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	36.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	36.04	Range of Writing	
	36.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
37.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Technology Support Services.	
	37.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	37.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	37.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	37.04	Model with mathematics. MAFS.K12.MP.4.1	
	37.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	37.06	Attend to precision. MAFS.K12.MP.6.1	
	37.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
37.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
55.0 Describe the operation of data networks. – The student will be able to:		
55.01 Explain the function of common networking protocols.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
55.02 Identify commonly used TCP and UDP default ports.		
55.03 Identify address formats.		
55.04 Identify the proper use of addressing technologies and addressing schemes.		
55.05 Identify common IPv4 and IPv6 routing protocols.		
55.06 Explain the purpose and properties of routing.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
55.07 Compare the characteristics of wireless communication standards.	MAFS.912.N-VM.2.4 MAFS.912.N-VM.2.5	
55.08 Interpret network diagrams.	MAFS.912.G-MG.1.3 MAFS.912.N-Q.1.2	
55.09 Describe common networking applications.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
56.0 Differentiate between various network media and topologies. – The student will be able to:		
56.01 Categorize standard cable types and their properties.		
56.02 Identify common connector types.		
56.03 Identify common physical network topologies.		
56.04 Differentiate and implement appropriate wiring standards.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
56.05	Select the appropriate media, cables, ports, and connectors to connect network devices.		
56.06	Categorize WAN technology types and properties.		
56.07	Categorize LAN technology types and properties.		
56.08	Explain common logical network topologies and their characteristics.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
56.09	Install components of wiring distribution.		
57.0	Install and configure basic network devices. – The student will be able to:		
57.01	Install, configure and differentiate between common network devices.		
57.02	Identify the functions of specialized network devices.		SC.912.N.3.1
57.03	Explain the advanced features of a switch.		
57.04	Implement a small switched network, including remote access management.		SC.912.N.1.1
57.05	Verify network status and operation using basic utilities (e.g., ping, traceroute, telnet, SSH, arp, ipconfig).		
57.06	Implement a basic wireless network.		
58.0	Demonstrate proficiency using basic network tools. – The student will be able to:		
58.01	Select the appropriate command line interface tool and interpret the output to verify functionality.		
58.02	Explain the purpose of network scanners.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
58.03	Utilize the appropriate hardware tools.		SC.912.N.1.1
59.0	Demonstrate an understanding of network IP addressing and associated issues. – The student will be able to:		
59.01	Assign and verify valid IP addresses in a LAN environment.		SC.912.N.1.1 SC.912.N.1.2
59.02	Describe Network Address Translation (NAT) and its role in network communication.	LAFS.910.SL.1.1 LAFS1112.SL.1.1	
59.03	Distinguish between public and private IP addresses.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	59.04 Explain the operation of DHCP and DNS services and their impact on network client systems.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
	59.05 Detect and correct IP addressing issues.		
60.0	Demonstrate an understanding of network management tasks and methodologies. – The student will be able to:		
	60.01 Explain the function of each layer of the OSI model.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
	60.02 Identify types of configuration management documentation.		
	60.03 Evaluate the network based on configuration management documentation.		
	60.04 Explain network segmentation and traffic management concepts.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
	60.05 Conduct network monitoring to identify performance and connectivity issues.		
	60.06 Explain different methods and rationales for network performance optimization.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
	60.07 Configure updates to a network operating system to include manual, automatic, and rollback aspects.		
	60.08 Implement network troubleshooting methodologies.		SC.912.N.1.1
	60.09 Troubleshoot common connectivity issues and select an appropriate solution.		SC.912.N.1.3
61.0	Implement a Wireless Local Area Network (WLAN). – The student will be able to:		
	61.01 Describe the standards associated with wireless media.	LAFS.910.SI.1.1 LAFS1112.SI.1.1	
	61.02 Identify and describe the purpose of the components of a small WLAN.		
	61.03 Configure a small WLAN such that devices connect to the correct access point.		
	61.04 Describe the security features and capabilities of WI-FI Protected Access (WPA).	LAFS.910.SI.1.1 LAFS1112.SI.1.1	
	61.05 Describe common issues with implementing a WLAN and methods for addressing these issues.	LAFS.910.SI.1.1 LAFS1112.SI.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
62.0 Demonstrate an understanding of network security threats and mitigation techniques. – The student will be able to:		
62.01 Explain the function of hardware and software security devices.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
62.02 Explain common features of a firewall.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	SC.912.L.14.2
62.03 Explain the methods of network access security.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
62.04 Explain methods of user authentication.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
62.05 Explain issues that affect device security.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
62.06 Implement password and physical security in a small routed network.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
62.07 Identify common security threats and mitigation techniques.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
63.0 Demonstrate proficiency with troubleshooting network operating systems. – The student will be able to:		
63.01 Select the appropriate commands and options to troubleshoot and resolve problems.		SC.912.N.1.3
63.02 Select and use system utilities/tools appropriate to a problem and evaluate the results.		SC.912.N.1.1
63.03 Evaluate and resolve common issues.		SC.912.N.1.3
64.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
64.01 Employ leadership skills to accomplish organizational goals and objectives.		
64.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	64.03 Conduct and participate in meetings to accomplish work tasks.		
	64.04 Employ mentoring skills to inspire and teach others.		
65.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
	65.01 Identify and demonstrate positive work behaviors needed to be employable.		
	65.02 Develop personal career plan that includes goals, objectives, and strategies.	LAFS.910.W.2.5 LAFS.1112.W.2.5	
	65.03 Examine licensing, certification, and industry credentialing requirements.		
	65.04 Maintain a career portfolio to document knowledge, skills, and experience.		
	65.05 Evaluate and compare employment opportunities that match career goals.		
	65.06 Identify and exhibit traits for retaining employment.		
	65.07 Identify opportunities and research requirements for career advancement.		
	65.08 Research the benefits of ongoing professional development.	LAFS.910.W.3.7 LAFS.1112.W.3.7	
	65.09 Examine and describe entrepreneurship opportunities as a career planning option.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	

Florida Department of Education
Student Performance Standards

Course Title: **Technology Support Services - Specialized Technologies**
Course Number: **9001440**
Course Credit: **1**

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
66.0	Configure Full Disk Encryption (FDE) software (e.g., BitLocker, BitLocker To Go). – The student will be able to:		
66.01	Describe disk encryption and its role and benefits in computer system security.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
66.02	Compare and contrast disk encryption with file system encryption.		
66.03	Configure system policies to accommodate full disk encryption.		
66.04	Explain the role of the Trusted Platform Module (TPM) relative to computer system identification and security.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.W.2.4 LAFS.1112.W.2.4	
66.05	Manage TPM startup keys.		
66.06	Configure startup key storage.		
66.07	Describe a Data Recovery Agent (DRA) and its role in system security.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
66.08	Configure a DRA on a client and network server.		
66.09	Perform data and system recovery operations.		
67.0	Configure intranet tunneling software (e.g., DirectAccess, Barracuda). – The student will be able to:		
67.01	Describe Internet Protocol Security (IPSec) and its role in secure tunnel connectivity.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
67.02	Compare and contrast the characteristics and operation of an infrastructure tunnel and an intranet tunnel.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1 MAFS.912.S-CP.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	67.03 Configure endpoints required for an intranet tunnel connection.		
	67.04 Configure system and user authentication for an intranet tunnel connection.		
	67.05 Define the requirements for establishing a network infrastructure tunnel.		
	67.06 Resolve tunnel connectivity issues.		
68.0	Demonstrate proficiency with Network Mobility (NEMO) basic support protocol. – The student will be able to:		
	68.01 Describe NEMO and its unique challenges (e.g., attachment transparency, session consistency).	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
	68.02 Compare and contrast the three NEMO deployment scenarios (i.e., airline, automotive, personal).		
	68.03 Configure offline file policies for synchronized access to network shared files.		
	68.04 Describe transparent caching and explain its role in optimizing network performance, particularly mobile networks.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
	68.05 Describe Power over Ethernet (PoE) and its role in creating a power management schema.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
69.0	Demonstrate proficiency in configuring and maintaining remote connections. – The student will be able to:		
	69.01 Establish a Virtual Private Network (VPN) connection with authentication.		
	69.02 Enabling a VPN reconnect to accommodate mobile remote users.		
	69.03 Perform a Strength, Weakness, Opportunity, and Threat (SWOT) analysis of a local area network configured for remote access connectivity.		
	69.04 Describe Network Access Protection (NAP) and its role in ensuring health and compliance of connected devices.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
	69.05 Compare and contrast the use of quarantine and captive portals to accomplish remediation of connected devices.		SC.912.L.14.52
	69.06 Configure NAP for wireless remote connections.		
	69.07 Configure dial-up connections.		
	69.08 Enable and configure remote desktop in both client and server environments.		
70.0	Perform installation, configuration, and management operations for both client and server disks. – The student will be able to:		
	70.01 Install, initialize, and partition a hard drive.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
70.02 Describe file system fragmentation and its impact on system performance.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
70.03 Performa file system defragmentation.		
70.04 Describe Redundant Array of Independent Disks (RAID) configuration.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	
70.05 Configure removable device policies.		
71.0 Monitor system performance. – The student will be able to:		
71.01 Configuring event logging.		
71.02 Filtering event logs.		
71.03 Event subscriptions.		
71.04 Data collector sets.		
71.05 Generating a system diagnostics report.		
72.0 Optimize system performance. – The student will be able to:		
72.01 Calculate and configure the size of page files to optimize virtual memory performance.		
72.02 Configure the hard drive cache for optimum interface transfer rate.		
72.03 Update device drivers.		
72.04 Configure a Network Interface Card (NIC) for full duplex operation.		
72.05 Create a power plan (scheme) for optimum power/energy efficiency.		
72.06 Configure performance settings under Advanced System Properties.		
72.07 Configure desktop settings and user profiles.		
72.08 Configure services and programs to resolve performance issues.		
72.09 Resolve mobile computing performance issues.		
73.0 Demonstrate proficiency with troubleshooting specialized network and communications devices. – The student will be able to:		
73.01 Select the appropriate commands and options to troubleshoot and resolve problems with network devices.		SC.912.N.1.3

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	73.02 Select and use system utilities/tools appropriate to a problem and evaluate the results.		SC.912.N.1.1
	73.03 Evaluate and resolve common issues related to network connectivity, security, and performance of connected devices.		SC.912.N.1.3
74.0	Configure and maintain network-based technologies associated with providing web services. – The student will be able to:		
	74.01 Configure and maintain a web server, to include setting up authentication, security certificates, and permissions for Active Server Page operation.		
	74.02 Configure and maintain Data Source Name (DSN) services.		
	74.03 Configure and maintain a File Transfer Protocol (FTP) server, to include setting up access and permissions.		
	74.04 Configure and maintain a Simple Mail Transfer Protocol (SMTP) server, to include setting up security, permissions, and SMTP relay.		
	74.05 Configure and maintain a Post Office Protocol (POP) server, to include setting up access, permissions, and defaults.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Cloud Computing & Virtualization**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9001500
CIP Number	0511100312
Grade Level	8-12, 30, 31
Standard Length	6 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Computer Support Assistant, Network Support Technician, Cloud Specialist, Cloud Virtualization Engineer in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of six occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	**Level**	**Graduation Requirement**
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	9001510	Computer Engineering & Support	1 credit	15-1151	3	VO
C	9001520	Network Engineering & Support	1 credit	15-1142	3	VO
D	9001530	Essentials of Cloud Technology	1 credit	15-1142	3	VO
E	9001540	Basics of Cloud Computing & Virtualization	1 credit	15-1142	3	VO
F	9001550	Advanced Cloud Computing & Virtualization	1 credit	15-1142	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)
Note: Digital Information Technology is recommended.

Students must take Basics of Cloud Computing & Virtualization (course #) as a prerequisite of Advanced Cloud Computing & Virtualization (course #).

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9001510	**	**	**	**	**	**	**	**	**	**	**
9001520	**	**	**	**	**	**	**	**	**	**	**
9001530	**	**	**	**	**	**	**	**	**	**	**
9001540	**	**	**	**	**	**	**	**	**	**	**
9001550	**	**	**	**	**	**	**	**	**	**	**

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
9001510	**	**	**	**	**	**	**
9001520	**	**	**	**	**	**	**
9001530	**	**	**	**	**	**	**
9001540	**	**	**	**	**	**	**
9001550	**	**	**	**	**	**	**

*** Alignment pending review* *# Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Cloud Computing & Virtualization.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Cloud Computing & Virtualization.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Cloud Computing & Virtualization.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
19.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules.
20.0 Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment.
21.0 Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
22.0 Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems.
23.0 Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems.

24.0 Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked.
25.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
26.0 Demonstrate proficiency using graphical user interface (GUI) operating systems.
27.0 Demonstrate language arts knowledge and skills.
28.0 Demonstrate mathematics knowledge and skills.
29.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Cloud Computing & Virtualization.
30.0 Methods and strategies for using Florida Standards for grades 11-1 writing in Technical Subjects for student success in Cloud Computing & Virtualization.
31.0 Methods and strategies for using Florida Standards for grades 11-1 Mathematical Practices in Technical Subjects for student success in Cloud Computing & Virtualization.
32.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
33.0 Participate in work-based learning experiences.
34.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, internet, remote access, or direct contact.
35.0 Perform installation and configuration activities.
36.0 Demonstrate proficiency using computer networks.
37.0 Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers.
38.0 Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability.
39.0 Demonstrate proficiency in managing, configuring and troubleshooting storage use.
40.0 Demonstrate proficiency in configuring and troubleshooting network connections.
41.0 Demonstrate proficiency in implementing, monitoring, and troubleshooting security.
42.0 Evaluate and analyze cloud principles used in cloud computing.
43.0 Identify the components of cloud based services.
44.0 Evaluate cloud based services.
45.0 Use cloud-based services.
46.0 Evaluate and analyze techniques and methods of cloud deployment.
47.0 Evaluate the risks of cloud-based systems.
48.0 Demonstrate an awareness of cloud implementation.
49.0 Demonstrate an understanding of virtualization concepts.
50.0 Install and configure the virtualization server platform.
51.0 Install, configure and manage virtualized clients.
52.0 Demonstrate an understanding of storage technologies and storage configuration.
53.0 Demonstrate proficiency in managing a virtualization infrastructure.
54.0 Demonstrate proficiency in network optimization using network protocols, ports, and topologies.
55.0 Understand security in a virtualized environment.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Computer Engineering and Support**
Course Number: **9001510**
Course Credit: **1**

Course Description:

This course is designed to develop competencies needed for employment in computer operations and technology including leadership and the ability to diagnose and resolve computer problems. The content includes instruction in basic hardware configuration, hardware and software troubleshooting, operating systems, and computer networking.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Cloud Computing & Virtualization.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Cloud Computing & Virtualization.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards			Correlation to CTE Program Standard #
		capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Cloud Computing & Virtualization.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:		
18.01 Develop strategies for resolving customer conflicts.		
19.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules. – The student will be able to:		
19.01 Identify and describe the functions of main processing boards (e.g., CPUs, RAM, ROM, bus architecture).		
19.02 Identify and describe the functions of communication ports (e.g., serial and parallel ports).		
19.03 Identify and describe the functions of peripheral devices (e.g., scanners, modems, hard drives, printers).		
19.04 Identify and describe the components of portable systems (e.g., battery, LCD, AC adapter, PDAs).		
19.05 Troubleshoot, install and upgrade computers and peripherals.		
19.06 Perform system hardware setup Demonstrate an understanding of input/output devices.		
19.07 Install and configure of applications software, hardware, and device drivers.		
19.08 Demonstrate an understanding of the operation and purpose of hardware components.		
19.09 Install operating system software.		
19.10 Customize operating systems.		
19.11 Install application software.		
19.12 Perform storage formatting and preparation activities.		
19.13 Identify data measurement (e.g., bits, bytes, kilobytes).		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	19.14 Install and configure RAID.		
	19.15 Recognize and report on server room environmental issues (temperature, humidity/ESD/power surges, back-up).		
20.0	Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment. – The student will be able to:		
	20.01 Troubleshoot a personal computer system.		
	20.02 Identify configuration problems.		
	20.03 Identify software problems.		
	20.04 Identify hardware malfunctions.		
	20.05 Identify network malfunctions.		
	20.06 Resolve computer error messages.		
	20.07 Understand and troubleshoot memory and cache systems.		
	20.08 Verify that drives are the appropriate type.		
	20.09 Describe knowledge database search procedures used to identify possible solutions when troubleshooting software and hardware problems.		
21.0	Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace. – The student will be able to:		
	21.01 Apply basic rules for hardware safety.		
	21.02 Demonstrate proficiency in basic preventative hardware maintenance.		
	21.03 Apply special disposal procedures that comply with environmental guidelines for batteries, CRTs, toner kits/cartridges, chemical solvents and cans, and MSDS.		
	21.04 Apply ergonomic principles applicable to the configuration of computer workstations.		
	21.05 Describe ethical issues and problems associated with computers and information systems.		
22.0	Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems. – The student will be able to:		
	22.01 Identify EDO RAM, DRAM, SRAM, RIMM, VRAM, SDRAM, and WRAM.		
	22.02 Identify memory banks, memory chips (8-bit, 16-bit, and 32-bit), SIMMS (Single In-line Memory Module), DIMMS (Dual In-line Memory Module), parity chips versus non-parity		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	chips.		
22.03	Identify printer parallel port, COM/serial port, floppy drive, hard drive, Memory, and Boot sequence.		
23.0	Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems. – The student will be able to:		
23.01	Identify types of printers—Laser, Inkjet, Dot Matrix.		
23.02	Identify care and service techniques and common problems with primary printer types.		
23.03	Implement and manage printing on a network.		
24.0	Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked. – The student will be able to:		
24.01	Define networking and describe the purpose of a network.		
24.02	Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).		
24.03	Describe the various types of network topologies.		
24.04	Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.		
24.05	Configure network and verify network connectivity.		
24.06	Discuss the responsibilities of the network administrator (e.g., rights and responsibilities).		
24.07	Develop user logon procedures.		
24.08	Utilize network management infrastructures (e.g., network monitoring, alerting, security) to perform administrative tasks.		
24.09	Identify common backup strategies and procedures.		
24.10	Select and use appropriate electronic communications software and hardware for specific tasks.		
24.11	Compare and contrast Internet software and protocols.		
24.12	Diagnose and resolve electronic communications operational problems.		
24.13	Design and implement directory tree structures.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	24.14 Install services tools (SNMP, backup software).		
	24.15 Perform full backup and verify backup.		
	24.16 Identify bottlenecks (e.g., processor, bus transfer, I/O, disk I/O, network I/O, memory).		
	24.17 Use the concepts of fault tolerance/fault recovery to create a disaster recovery plan.		
	24.18 Document and test disaster recovery plan regularly, and update as needed.		
25.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, internet, remote access, or direct contact. – The student will be able to:		
	25.01 Apply call center vocabulary.		
	25.02 Listen and input information simultaneously.		
	25.03 Apply first response assistance for minor repair work.		
26.0	Demonstrate proficiency using graphical user interface (GUI) operating systems. – The student will be able to:		
	26.01 Identify parts of GUI windows.		
	26.02 Create and use icons.		
	26.03 Demonstrate proficiency in using menu systems.		
	26.04 Demonstrate proficiency in using pointing and selection devices.		
	26.05 Identify keyboard shortcuts and special function keys.		
	26.06 Demonstrate proficiency in manipulating windows.		
	26.07 Utilize help systems and hypertext links.		
	26.08 Create, organize, and maintain file system directories.		
	26.09 Organize desktop objects.		
	26.10 Run multiple applications.		
27.0	Demonstrate language arts knowledge and skills. – The student will be able to:		
	27.01 Locate, comprehend and evaluate key elements of oral and written information.		
	27.02 Draft, revise, and edit written documents using correct grammar, punctuation and		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
vocabulary.		
27.03 Present information formally and informally for specific purposes and audiences.		
28.0 Demonstrate mathematics knowledge and skills. – The student will be able to:		
28.01 Demonstrate knowledge of arithmetic operations.		
28.02 Analyze and apply data and measurements to solve problems and interpret documents.		
28.03 Construct charts/tables/graphs using functions and data.		

Florida Department of Education
Student Performance Standards

Course Title: **Network Engineering and Support**
Course Number: **9001520**
Course Credit: **1**

Course Description:

This course is designed to develop competencies needed for employment in network operations and technology including leadership and the ability to diagnose and resolve systemic or network computer problems. The content includes instruction in basic hardware configuration, hardware and software troubleshooting, operating systems, and computer networking.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Cloud Computing & Virtualization.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Cloud Computing & Virtualization.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Cloud Computing & Virtualization.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:		
32.01 Develop diplomatic methods to communicate with customers.		
33.0 Participate in work-based learning experiences. – The student will be able to:		
33.01 Participate in work-based learning experiences in a network support services environment.		
33.02 Discuss the use of technology in a network environment.		
34.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact. – The student will be able to:		
34.01 Apply first response assistance for minor repair work.		
35.0 Perform installation and configuration activities. – The student will be able to:		
35.01 Configure the operating system environment.		
35.02 Connect client workstation running similar operating system to the network.		
35.03 Configure Internet access for a network.		
35.04 Configure a Web server.		
35.05 Use remote server to deploy operating system.		
35.06 Troubleshoot failed installations.		
35.07 Install and configure network services for interoperability.		
35.08 Monitor, configure, troubleshoot and control access to printers.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	35.09 Monitor, configure, troubleshoot and control access to files, folders, and shared folders.		
	35.10 Monitor, configure, troubleshoot and control access to Web sites.		
36.0	Demonstrate proficiency using computer networks. – The student will be able to:		
	36.01 Identify and describe the purpose of standards; protocols; and the Open Systems Interconnection (ISO) reference model.		
37.0	Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers. – The student will be able to:		
	37.01 Configure hardware devices.		
	37.02 Configure driver signing options.		
	37.03 Update device drivers.		
	37.04 Troubleshoot problems with hardware.		
38.0	Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability. – The student will be able to:		
	38.01 Monitor and optimize usage of system resources.		
	38.02 Manage processes.		
	38.03 Optimize disk performance.		
	38.04 Manage and optimize availability of system data and user data.		
	38.05 Recover systems and user data.		
39.0	Demonstrate proficiency in managing, configuring and troubleshooting storage use. – The student will be able to:		
	39.01 Configure and manage user profiles.		
	39.02 Monitor, configure and troubleshoot disks and volumes.		
	39.03 Configure data compression.		
	39.04 Monitor and configure disk quotas.		
	39.05 Recover from disk failures.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
40.0	Demonstrate proficiency in configuring and troubleshooting network connections. – The student will be able to:		
40.01	Install, configure and troubleshoot shared access.		
40.02	Install, configure and troubleshoot a virtual private network.		
40.03	Install, configure and troubleshoot network protocols.		
40.04	Install and configure network services.		
40.05	Configure, monitor and troubleshoot remote access.		
40.06	Install, configure, monitor and troubleshoot Terminal Services.		
40.07	Configure the properties of a connection.		
40.08	Install, configure and troubleshoot network adapters and drivers.		
41.0	Demonstrate proficiency in implementing, monitoring, and troubleshooting security. – The student will be able to:		
41.01	Encrypt data on a hard disk by using Encrypting File System.		
41.02	Implement, configure, manage and troubleshoot policies in an operating system environment.		
41.03	Implement, configure, manage and troubleshoot auditing.		
41.04	Implement, configure, manage and troubleshoot local accounts.		
41.05	Implement, configure, manage and troubleshoot account policy.		
41.06	Implement, configure, manage and troubleshoot security by using the Security Configuration Tool Set.		

Florida Department of Education
Student Performance Standards

Course Title: **Essentials of Cloud Technology**
Course Number: **9001530**
Course Credit: **1**

Course Description:

This course is designed to develop competencies needed for employment in computer engineering including knowledge of networking, storage, and database technologies. The content includes instruction in hardware and software and developing a functional understanding of the technologies and troubleshooting methods used to support guests in a virtualization layer.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Cloud Computing & Virtualization.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Cloud Computing & Virtualization.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Cloud Computing & Virtualization.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
42.0 Evaluate and analyze concepts used in cloud computing. – The student will be able to:		
42.01 Demonstrate an understanding of the evolution of cloud computing.		
42.02 Describe the four main deployment models for cloud computing, public, private, community, and hybrid.		
42.03 Describe the three main service models for cloud computing (SaaS, Paas, and Laas).		
42.04 Describe cloud computing roles (cloud computing customer, cloud service provider and cloud service partner).		
42.05 Describe cloud characteristics (on-demand self-service, broad network access, multi-tenancy, rapid elasticity)		
42.06 Describe the role of the Internet and Building Block Technologies of virtualization, storage, networking and databases in cloud computing.		
42.07 Understand and identify managed services in cloud computing.		
43.0 Identify the components of cloud-based services. – The student will be able to:		
43.01 Demonstrate proficiency in accessing web applications through web browser.		
43.02 Describe, identify and use thin clients to complete business tasks.		
43.03 Describe, identify and use thick clients to complete business tasks.		
43.04 Describe, identify and use mobile clients to complete business tasks.		
43.05 Demonstrate an awareness application hosting.		
43.06 Demonstrate an awareness of multipurpose architecture.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
44.0	Evaluate cloud-based services. – The student will be able to:		
44.01	Understand the economics of different cloud based models for an organization.		
44.02	Compare and contrast cloud based services used in industry.		
44.03	Identify the impacts to current and future staffing and operational needs.		
44.04	Evaluate performance of cloud-based solutions using performance indicators.		
45.0	Use cloud-based services. – The student will be able to:		
45.01	Compare and contrast outsourcing and cloud computing as alternatives for business.		
45.02	Identify and use cloud based services to improve productivity.		
45.03	Compare and contrast cloud based services for consumer and business.		
45.04	Use cloud based services to perform collaboration online.		
45.05	Demonstrate an awareness of the user experience in using a cloud-based service as compared to traditional business model.		
46.0	Evaluate and analyze techniques and methods of cloud deployment, and design principles of secure cloud computing. – The student will be able to:		
46.01	Demonstrate an awareness of networking for cloud-based solutions.		
46.02	Demonstrate an awareness of the role of automation and self-service in regard to cloud-based solutions & cloud security data lifecycle.		
46.03	Demonstrate understanding of the cloud based business continuity/ disaster recovery planning.		
46.04	Demonstrate an awareness of deployment and management of internal and external cloud services cost benefit analysis to complete business task.		
46.05	Demonstrate understanding of the functional security requirements (portability, interoperability, vendor lock-in).		
46.06	Demonstrate an awareness of the role standardization in cloud-based solutions.		
46.07	Demonstrate the impact of time to market, distribution over the Internet in cloud deployment.		
47.0	Evaluate the risks of cloud-based systems. – The student will be able to:		
47.01	Identify and evaluate compliance risks relating to software and vendors in cloud-based systems.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
47.02	Demonstrate an understanding of user privacy rights and privacy risks in cloud-based systems.		
47.03	Demonstrate understanding of system/subsystem product certifications (common criteria, FIPS I 40-2).		
47.04	Demonstrate an understanding of legal risks in cloud based systems.		
47.05	Understand the role of vendors and dependencies in cloud-based solutions.		
47.06	Demonstrate an understating of the risks of hardware independence.		
47.07	Identify the main aspects of identity management.		
48.0	Demonstrate an awareness of cloud implementation security concepts. – The student will be able to:		
48.01	Describe the risk of connecting a local cloud network to the public Internet Cryptography (encryption, in motion, at rest, key management).		
48.02	Describe the use of a Virtual Private network access to Local Area Network.		
48.03	Identify and describe the components of cloud environment, data and media sanitization (overwriting, cryptographic erase).		
48.04	Demonstrate an understanding of networking topologies network security in cloud environment.		
48.05	Demonstrate an understanding of servers, switches, and routers in cloud-based architecture virtualization security (hypervisor security) and common threats.		
48.06	Demonstrate an understanding of the role of the datacenter in cloud-based architecture.		

Florida Department of Education
Student Performance Standards

Course Title: **Basics of Cloud Computing & Virtualization**
Course Number: **9001540**
Course Credit: **1**

Course Description:

This course is designed to develop competencies needed for employment in computer engineering including knowledge of networking, storage, and database technologies. The content includes instruction in cloud technologies and troubleshooting methods. The content will provide a foundation for skills to analyze and resolve software and/or hardware problems; diagnose and resolve complex problems and work as a team. Increased understanding of networking protocols, operating systems, software development, web protocols, device programming, or other computing and systems paradigms.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
49.0	Demonstrate an understanding of virtualization concepts. – The student will be able to:		
49.01	Demonstrate an understanding of the role of the virtual CPU in virtualization.		
49.02	Demonstrate an understanding of the role of virtual memory in virtual component.		
49.03	Demonstrate an understanding of system patching for virtual environment.		
49.04	Demonstrate an understanding of virtual desktops.		
49.05	Evaluate the components of networking topology including (servers, network, storage).		
49.06	Compare and contrast traditional desktops and servers to virtual counterpart.		
49.07	Demonstrate an understanding of the hardware requirements to create and scale a virtual infrastructure.		
49.08	Demonstrate the differences between traditional virtualization and para-virtualization.		
49.09	Identify, describe and use guest operating system in a virtualization environment.		
49.10	Identify, define and use virtual machine monitor in virtual environment.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
49.11	Perform virtual partitioning through the Hypervision.		
49.12	Demonstrate an awareness of the bare metal approach for virtualization portioning.		
49.13	Demonstrate an awareness of hosted virtualization as a virtualization approach.		
49.14	Understand and use industry standards for hardware support for virtualization.		
49.15	Demonstrate an understanding of high-level language virtual machines.		
49.16	Describe the benefits of server consolidation and containment acquired through migration to virtualization.		
49.17	Describe the benefits of test and development optimization gained through virtualization.		
49.18	Demonstrate how virtualization reduces cost and complexity of high availability and disaster recovery.		
49.19	Demonstrate how virtualization can enhance security in the enterprise.		
50.0	Install and configure the virtualization server platform. – The student will be able to:		
50.01	Demonstrate an understanding of a virtual image and compare that to a golden image.		
50.02	Create a virtual image using a virtualization platform using a base operating system.		
50.03	Create a virtual template in which the golden image is configured with the software packages and application.		
50.04	Configure the virtual template to ensure software settings and organizational polices are implemented.		
50.05	Manage inventory objects licenses using the virtual infrastructure ensure to comply with enterprise requirements.		
50.06	Demonstrate how a virtual switch is used to create communication between virtual machines.		
50.07	Perform communication between two virtual machines through the use of a virtual switch.		
50.08	Create, manage and configure virtual switches to enable communication of virtual machines in different hosts.		
50.09	Use virtual system management to remotely manage the allocation in a virtual network.		
50.10	Perform and manage user roles and permission in a virtual environment.		
50.11	Perform server patching on a virtual environment both on traditional servers as well virtual servers.		
50.12	Create a patching baseline.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
51.0	Install, configure and manage virtualized clients. – The student will be able to:		
51.01	Demonstrate an awareness of peripheral redirection.		
51.02	Demonstrate proficiency in configuring virtual client to enable both USB and monitor redirection.		
51.03	Compare and contrast the use of peripherals in a traditional and virtual environment.		
51.04	Demonstrate an understanding of the types of virtual clients used in a virtualization infrastructure.		
51.05	Demonstrate proficiency in performing tasks using thin, thick and mobile virtualization clients.		
51.06	Compare and contrast the performance, ease of use and efficiency of different clients in completing business tasks.		
51.07	Analyze business tasks that are better aligned to a particular virtualization client type.		
51.08	Demonstrate proficiency in managing user sessions and policies of virtual clients.		
52.0	Demonstrate an understanding of storage technologies and storage configuration. – The student will be able to:		
52.01	Demonstrate an awareness of the evolution of storage architecture and data center components.		
52.02	Describe, identify and use data center elements host, connectivity and storage.		
52.03	Identify describe, and use RAID technology in an enterprise environment.		
52.04	Identify the impact to application performance based on RAID implementation.		
52.05	Demonstrate an awareness of intelligent storage system.		
52.06	Compare and contrast storage systems for a virtualization infrastructure.		
52.07	Demonstrate an awareness of storage network technologies (Fibre Channel Storage Network FC Scan, IP Scan, Fibre Channel over Ethernet, Network Attached Storage, Object Based, Unified Storage).		
52.08	Identify the appropriate storage network solutions based on client requirements.		
52.09	Demonstrate proficiency in creating and managing data stores.		
52.10	Demonstrate proficiency in configuring and managing resource pools.		

Florida Department of Education
Student Performance Standards

Course Title: **Advanced Cloud Computing & Virtualization**
Course Number: **9001550**
Course Credit: **1**

This course is designed to develop competencies needed for employment in computer engineering including knowledge of networking, storage, and database technologies. The content includes instruction in cloud technologies and troubleshooting methods. The content will allow students to demonstrate their ability to analyze and resolve software and/or hardware problems; diagnose and resolve complex problems and work as a team. Experiential learning is designed to increase students' understanding of networking protocols, operating systems, software development, web protocols, device programming, or other computing and systems paradigms.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

This course is pending alignment in the following categories: FS-M/LA and NGSSS-Sci.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
53.0	Demonstrate proficiency in managing a virtualization infrastructure. – The student will be able to:		
53.01	Demonstrate an understanding of the process of cloning virtual machines.		
53.02	Identify the benefits of cloning in a virtual infrastructure.		
53.03	Compare and contrast full clones and linked clones.		
53.04	Demonstrate proficiency in identifying situations in which cloning is a proper solution.		
53.05	Demonstrate proficiency in deploying virtual machines using cloning.		
53.06	Demonstrate an understating of virtual migration.		
53.07	Demonstrate an understanding of the situational needs that require a virtual migration.		
53.08	Identify the role of network bandwidth and resource allocation needed for virtual migration.		
53.09	Demonstrate an understanding of automating migration to the host server.		
53.10	Identify the process that migration affect virtual disk storage in particular SANS.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	53.11 Demonstrate proficiency in developing action steps to execute a virtual migration.		
54.0	Demonstrate proficiency in network optimization using network protocols, ports, and topologies. – The student will be able to:		
	54.01 Demonstrate an awareness of disaster recovery (business continuity) information availability for virtualized and non-virtualized environments.		
	54.02 Demonstrate proficiency in backup and recovery in both virtualized and non-virtualized environments.		
	54.03 Demonstrate an awareness of deduplication technology for backup optimization.		
	54.04 Demonstrate an awareness of fixed content storage requirements and archival solutions.		
	54.05 Demonstrate an awareness of continuous data replication and remote replication in virtualized and non-virtualized environments.		
	54.06 Demonstrate proficiency in integrating Active Directory to a virtual environment.		
	54.07 Demonstrate proficiency in CPU and memory optimization.		
	54.08 Demonstrate proficiency using remote desktops and display protocols to optimize network infrastructure.		
	54.09 Demonstrate an awareness of fault tolerance and acceptable levels tolerated based on the infrastructure.		
55.0	Understand security in a virtualized environment. – The student will be able to:		
	55.01 Compare and contrast hosted and Bare-Metal virtualization implementations vulnerability to threats and attacks.		
	55.02 Demonstrate an awareness of data leakage and malicious code intrusion.		
	55.03 Demonstrate proficiency in securing data between guest and host environments.		
	55.04 Demonstrate proficiency in managing resource allocation in a virtualized environment to reduce system crash.		
	55.05 Demonstrate proficiency in creating images that are secure for client deployment.		
	55.06 Demonstrate an awareness of software security levels and digital signatures.		
	55.07 Demonstrate proficiency in using, configuring and managing host firewall in a virtualized infrastructure.		
	55.08 Demonstrate proficiency in using command line to configure and manage the host firewall.		
	55.09 Demonstrate proficiency in using logging tools to monitor activity in the virtual environment.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
55.10 Identify, describe and provide solutions to threats based on scalability and high availability.		
55.11 Demonstrate proficiency in securing mobile, thin and thick clients.		
55.12 Demonstrate an awareness of threats to network authentication in a virtualized environment.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. T

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Applied Information Technology**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9003400
CIP Number	0511010302
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to computer application skills including computer hardware, software applications, web applications, computer programming, web page design and advanced web tools, systems support and maintenance, network concepts, relational database concepts, multimedia tools, cybersecurity ; extensive exploration of information technology careers; strategies for success including goal setting, study skills, organizing skills, learning styles, employability skills, and service learning; and core academic skills with a strong emphasis on effective communication skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of eight occupational completion points. The Digital Information Technology course may be used as a substitute for IT Fundamentals (9001310) in this program. To complete this program, students must complete OCP A and OCP B, plus one or more of the subsequent OCPs (C-H).

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
		OR				
	9003410	Computer Fundamentals	1 credit	15-1151	2	VO
B	9003420	Web Technologies	1 credit	15-1151	3	VO
	9003430	IT Systems & Applications	1 credit		3	
C	9003440	Database Essentials	1 credit	15-1151	3	VO
D	9003450	Programming Essentials	1 credit	15-1151	3	VO
E	9003460	Web Development Technologies	1 credit	15-1151	3	VO
F	9003470	Multimedia Technologies	1 credit	15-1151	3	VO
G	9003480	Computer Networking Fundamentals	1 credit	15-1151	3	VO
H	9003490*	Cybersecurity Fundamentals	1 credit	15-1151	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

* Students should have a strong networking knowledge base prior to enrolling in this course. The Computer Networking Fundamentals course (9003480) is recommended to provide this knowledge base.

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9003410	4/87 5%	15/80 19%	25/83 30%	12/69 17%	27/67 40%	10/70 14%	7/69 10%	26/82 32%	12/66 18%	31/74 42%	12/72 17%
9003420	24/87 28%	31/80 39%	5/83 6%	27/69 39%	6/67 9%	26/70 37%	23/69 33%	7/82 9%	25/66 38%	10/74 14%	27/72 38%

9003430	26/87 30%	27/80 34%	6/83 7%	26/69 38%	6/67 9%	24/70 34%	26/69 38%	5/82 6%	22/66 33%	6/74 8%	26/72 36%
9003440	6/87 7%	13/80 16%	4/83 5%	11/69 16%	6/67 9%	9/70 13%	7/69 10%	7/82 9%	12/66 18%	8/74 11%	9/72 13%
9003450	4/87 5%	8/80 10%	4/83 5%	6/69 9%	4/67 6%	5/70 7%	5/69 7%	6/82 7%	8/66 12%	7/74 9%	5/72 7%
9003460	5/87 6%	11/80 14%	5/83 6%	8/69 12%	5/67 7%	6/70 9%	6/69 9%	8/82 10%	11/66 17%	9/74 12%	7/72 10%
9003470	4/87 5%	4/80 5%	2/83 2%	3/69 4%	2/67 3%	1/70 1%	4/69 6%	2/82 2%	4/66 6%	2/74 3%	3/72 4%
9003480	#	#	#	#	#	#	#	#	#	#	#
9003490	1/87 1%	4/80 5%	7/83 8%	3/69 4%	2/67 3%	4/70 6%	5/69 7%	4/82 5%	4/66 6%	4/74 5%	2/72 3%

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
9003410	16/67 24%	15/75 20%	11/54 20%	12/46 26%	12/45 27%	11/45 24%	11/45 24%
9003420	14/67 21%	11/75 15%	11/54 20%	#	#	#	#
9003430	18/67 27%	13/75 17%	14/54 26%	15/46 33%	15/45 33%	15/45 33%	15/45 33%
9003440	19/67 28%	16/75 21%	1/54 2%	#	#	#	#
9003450	12/67 18%	8/75 11%	3/54 6%	#	#	#	#
9003460	6/67 9%	3/75 4%	1/54 2%	#	#	#	#
9003470	7/67 10%	5/75 7%	2/54 4%	6/46 13%	6/45 13%	7/45 16%	7/45 16%
9003480	#	#	#	#	#	#	#
9003490	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Information Technology.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Information Technology.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Information Technology.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.

OR

Computer Fundamentals Standards:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Information Technology.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Information Technology.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Information Technology.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.

05.0 Practice quality performance.
06.0 Demonstrate knowledge of different operating systems.
07.0 Develop a familiarity with the information technology industry.
08.0 Develop an awareness of microprocessors and digital computers.
09.0 Develop an awareness of programming languages.
10.0 Develop an awareness of emerging technologies.
11.0 Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model.
12.0 Demonstrate an awareness of specialized software.
13.0 Identify computer components and their functions.
14.0 Demonstrate proficiency using the Internet to locate information.
15.0 Demonstrate proficiency using Hypertext Markup Language (HTML).
16.0 Demonstrate proficiency in webpage design.
17.0 Demonstrate proficiency using common software applications.
18.0 Develop an awareness of management functions and organizational structures as they relate to today's workplace and employer/ employee roles.
19.0 Perform e-mail activities.
20.0 Demonstrate proficiency in using presentation software and equipment.
21.0 Perform decision-making activities in a multimedia environment.
22.0 Demonstrate language arts knowledge and skills.
23.0 Demonstrate mathematics knowledge and skills.
24.0 Demonstrate science knowledge and skills.

AND

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Information Technology.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Information Technology.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Information Technology.
18.0 Demonstrate proficiency on the principles of design.
19.0 Demonstrate proficiency planning an effective website.
20.0 Demonstrate proficiency formulating a website.
21.0 Demonstrate proficiency using web development tools and techniques.
22.0 Demonstrate proficiency using specialized web design software.
23.0 Demonstrate proficiency gathering and preparing web content.
24.0 Demonstrate an awareness of preparing a website for launch.
25.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
26.0 Solve problems using critical thinking skills, creativity and innovation.
27.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Applied Information Technology.

28.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Applied Information Technology.
29.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Applied Information Technology.
30.0 Explain motherboard components, types and features.
31.0 Explain the purpose and characteristics of CPUs and their features.
32.0 Perform installation and configuration activities.
33.0 Demonstrate proficiency using computer networks.
34.0 Perform the process for problem diagnostics and problem resolution through wireless, infrared, telephone, e-mail, remote access, or direct contact.
35.0 Demonstrate knowledge of presentation production issues.
36.0 Demonstrate proficiency using computer networks.
37.0 Demonstrate proficiency communicating over the Internet.
38.0 Demonstrate proficiency in troubleshooting, repair and maintenance of computers.
39.0 Demonstrate proficiency in the basic principles of security concepts and technologies.
40.0 Demonstrate proficiency in operational procedures as they relate to computer equipment and components.
41.0 Use information technology tools.
42.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
43.0 Describe the importance of professional ethics and legal responsibilities.
44.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
45.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
46.0 Develop the process of creating an entity by identifying relationships.
47.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
48.0 Consider the degree and optionality of relationships of entities.
49.0 Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams.
50.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
51.0 Apply the complex ERM information by fine-tuning entities and the process for relating them.
52.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
53.0 Manipulating data.
54.0 Building and modifying tables.
55.0 Performing queries and filtering records.
56.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
57.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
58.0 Describe the importance of professional ethics and legal responsibilities.
59.0 Demonstrate personal money-management concepts, procedures, and strategies.
60.0 Plan program design.
61.0 Code programs.
62.0 Test programs.
63.0 Perform program maintenance.
64.0 Create and maintain documentation.

65.0 Develop an awareness of software quality assurance.
66.0 Develop an understanding of programming techniques and concepts.
67.0 Design structured programs.
68.0 Demonstrate proficiency in page design applicable to the WWW.
69.0 Demonstrate proficiency in web page design applicable to the WWW.
70.0 Demonstrate proficiency in using a WYSIWG editor, web design, or web animation software for web page design.
71.0 Demonstrate proficiency in using digital photography and digital imaging.
72.0 Design and create webpages suitable for publishing to the Internet.
73.0 Describe how website performance is monitored and analyzed.
74.0 Demonstrate proficiency in hosting a website.
75.0 Demonstrate the ability to attract traffic for a website.
76.0 Demonstrate knowledge of presentation production issues.
77.0 Demonstrate proficiency in using digital photography and digital imaging.
78.0 Demonstrate basic video production.
79.0 Demonstrate set-up and configuration of a computer for video applications.
80.0 Demonstrate the basic operation of a video workstation.
81.0 Demonstrate basic audio production.
82.0 Set-up and configure a computer for audio applications.
83.0 Operate an audio workstation.
84.0 Demonstrate proficiency in using presentation software and equipment.
85.0 Demonstrate understanding of network technologies.
86.0 Understand, install, and configure network hardware.
87.0 Understand, install and configure networking devices.
88.0 Understand, install and configure network management software.
89.0 Understand, install and configure networking tools.
90.0 Install, configure, and manage network security hardware and software devices.
91.0 Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends.
92.0 Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk.
93.0 Recognize and be able to differentiate and explain the following access control models.
94.0 Recognize and be able to differentiate and explain the following methods of authentication.
95.0 Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk.
96.0 Recognize and understand the processes and risks associated with the following security concerns and tasks.
97.0 Recognize and understand the administration of the following types of remote access technologies.
98.0 Recognize and understand the administration of the following email security concepts.
99.0 Recognize and understand the administration of the following Internet security concepts.
100.0 Recognize and understand the administration of the following vulnerabilities.
101.0 Recognize and understand the administration of the following directory security concepts.
102.0 Recognize and understand the administration of the following file transfer protocols and concepts.
103.0 Recognize and understand the administration of the following wireless technologies and concepts.
104.0 Compare and contrast the following types of intrusion detection in terms of implementation and configuration.
105.0 Be able to identify and explain the following different kinds of cryptographic algorithms.
106.0 Understand how cryptography and digital signatures address the following security concepts.

107.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure).
108.0 Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

OR

Florida Department of Education
Student Performance Standards

Course Title: **Computer Fundamentals**
Course Number: **9003410**
Course Credit: **1**

Course Description:

This course introduces students to the essential concepts, components, terminology, and knowledge about computers, computer systems, peripherals, and networks.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Information Technology.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Information Technology.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards			Correlation to CTE Program Standard #
		capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Information Technology.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance. – The student will be able to:		
04.01 Describe and use current and emerging computer technology and software to perform personal and business related tasks.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
04.02 Identify and describe communications and networking systems used in workplace environments.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
04.03 Locate and apply reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.2.4 LAFS.1112.RI.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
04.04	Troubleshoot problems with computer hardware peripherals and other office equipment.	MAFS.K12.MP.1.1	SC.912.N.1.1 SC.912.N.1.4
04.05	Describe ethical, privacy, and security issues and problems associated with computers and information systems.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.4.2
04.06	Demonstrate proficiency in using the basic features of GUI browsers.		
05.0	Practice quality performance. – The student will be able to:		
05.01	Assess personal, peer and group performance and identify and implement strategies for improvement (e.g., organizational skills, note taking/outlining, advance organizers, reasoning skills, problem-solving skills, and decision-making skills).	MAFS.K12.MP.3.1 LAFS.910.W.2.4 LAFS.1112.W.2.4	
05.02	Develop criteria for assessing products and processes that incorporate effective business practices (e.g., time management, productivity, total quality management).	LAFS.910.W.2.4 LAFS.1112.W.2.4	
06.0	Demonstrate knowledge of different operating systems. – The student will be able to:		
06.01	Identify operating system file naming conventions.		
06.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).		
06.03	Demonstrate a working knowledge of standard file formats.		SC.912.N.1.1-7
06.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, Unix/Linux).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
06.05 Differentiate between different operating systems and applications.		
06.06 Compare and contrast open source and proprietary software.	MAFS.912.S-IC.2.6 MAFS.912.A-CED.1.3 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
06.07 Display understanding of how system utilities help maintain a computer.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.6
07.0 Develop a familiarity with the information technology industry. – The student will be able to:		
07.01 Explain how information technology impacts the operation and management of business and society.	MAFS.912.F-IF.2.4 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.4.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
07.02 Identify and describe the various ways of segmenting the IT industry (e.g., hardware vs. software, server vs. client, business vs. entertainment, stable vs. mobile).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
07.03 Describe how digital technologies (social media) are changing both work and personal lifestyles.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.5 SC.912.N.1.6 SC.912.N.2.2 SC.912.N.4.2
08.0 Develop an awareness of microprocessors and digital computers. – The student will be able to:		
08.01 Describe the evolution of the digital computer.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
08.02 Explain the general architecture of a microcomputer system.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
08.03 Explain the evolution of microprocessors.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
08.04 Explain software hierarchy and its impact on microprocessors.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
08.05 Explain the need for and use of peripherals.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
08.06 Demonstrate proficiency installing and using plug-and-play peripherals.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
08.07 Identify the basic concepts of computer maintenance and upgrades.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
09.0 Develop an awareness of programming languages. – The student will be able to:		
09.01 Explain the evolution of programming languages.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1-7 SC.912.N.2.4 SC.912.N.3.2 SC.912.L.16.9
09.02 Explain the need for and use of compilers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1-7
09.03 Identify the three types of programming design approaches (e.g., top-down, structured, object-oriented).		
09.04 Compare the various types or classes of programming languages (e.g., compiled, interpretive).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
09.05	Differentiate among source code, machine code, interpreters, and compilers.		
09.06	Characterize the major categories of programming languages and how they are used.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
09.07	Create a model flowchart for a computer program.		SC.912.N.3.5 SC.912.N.1.7
09.08	Create a simple computer application program using JavaScript and HTML.	MAFS.912.N-Q.1.3 MAFS.912.MP.1.1 MAFS.912.MP.6.1	
09.09	Describe the stages in the software development life cycle and explain how to successfully implement them.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1 SC.912.N.3.5
10.0	Develop an awareness of emerging technologies. – The student will be able to:		
10.01	Compare and contrast emerging technologies and describe how they impact business in the global marketplace (e.g., wireless, wireless web, cell phones, portables/handhelds, smart appliances, home networks, peer-to-peer).	MAFS.912.S-IC.1.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4	SC.912.E.5.7 SC.912.L.17.15 SC.912.N.4.2

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
10.02 Describe social media as an emerging technology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4 SC.912.N.4.2
10.03 Adhere to published best practices for protecting personal identifiable information when using the Internet.		
10.04 Identify trends related to the use of information technology in people's personal and professional lives.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4 SC.912.N.4.2
10.05 Characterize how the rapid pace of change in information technology impacts our society.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8	SC.912.N.2.4 SC.912.N.4.2

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
11.0 Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model. – The student will be able to:		
11.01 Describe the evolution of OSI from its inception to the present and into the future.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4
11.02 Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
11.03 Describe the purpose of the OSI model and each of its layers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.3.5
11.04 Explain specific functions belonging to each OSI model layer.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4	SC.912.N.3.5

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
11.05 Understand how two network nodes communicate through the OSI model.		
11.06 Discuss the structure and purpose of data packets and frames.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
11.07 Describe the two types of addressing covered by the OSI model.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
12.0 Demonstrate an awareness of specialized software. – The student will be able to:		
12.01 Compare and contrast the appropriate use of specialized software (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation, process control, materials management).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
12.02 Research and report on the current state of specialized software (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation, process control, materials management).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1
12.03 Describe the hardware implications of using specialized software (e.g., RAM, hard drive size, CPU, storage devices).	MAFS.912.N-Q.1.3 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
13.0 Identify computer components and their functions. – The student will be able to:		
13.01 Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).		
13.02 Identify generic computer and programming terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
14.0 Demonstrate proficiency using the Internet to locate information. – The student will be able to:		
14.01 Identify and describe web terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
14.02 Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
14.03 Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
14.04 Describe and observe Internet/Intranet ethics and copyright laws and regulatory control.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
14.05	Trace the evolution of the Internet from its inception to the present and into the future.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.2.4
14.06	Demonstrate proficiency using search engines, including Boolean search strategies.		SC.912.N.1.1
14.07	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).		SC.912.N.1.1
14.08	Compare and contrast the roles of web servers and web browsers.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
15.0	Demonstrate proficiency using Hypertext Markup Language (HTML). – The student will be able to:		
15.01	Categorize websites according to their purpose.		
15.02	Describe the types of documents that might be used in a web environment (e.g., HTML, ASP, DHTML, XML, JS, CSS, PHP).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
15.03 Identify elements of a webpage.		
15.04 Define basic HTML terminology.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
15.05 Critique the aesthetic and functional operation of sample websites.	MAFS.912.MP.3.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
15.06 Create storyboards depicting a multi-page website (e.g., linear, hierarchical).		
15.07 Design, edit, and test HTML documents for accuracy and validity.		
15.08 Create and modify webpages using a Graphical User Interface (GUI) editor.		
15.09 Enhance webpages through the addition of images and graphics including animation.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
15.10 Analyze webpage source code developed by others.	MAFS.912.MP.3.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1 SC.912.N.2.5
15.11 Create webpages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).		
16.0 Demonstrate proficiency in webpage design. – The student will be able to:		
16.01 Develop an awareness of acceptable webpage design, including index pages in relation to the rest of the website.		SC.912.N.4.1
16.02 Describe and apply color theory as it applies to webpage design (e.g., background, text color).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
16.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).		SC.912.N.1.1
16.04 Use image design software to create and edit images.	MAFS.912.G-CO.1.1	
16.05 Demonstrate proficiency in publishing to the Internet.		
16.06 Demonstrate proficiency in adding downloadable forms to webpages.		
16.07 Explain the need for web-based applications.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6,	SC.912.N.4.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
17.0 Demonstrate proficiency using common software applications. – The student will be able to:		
17.01 Compare and contrast the appropriate use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
17.02 Demonstrate proficiency in the use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music).		
18.0 Develop an awareness of management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:		
18.01 Explore, design, implement, and evaluate organizational structures and cultures.		
18.02 Explore and demonstrate an awareness of current trends in business and the employee's role in maintaining productive business environments in today's global workplace.		
18.03 Collaborate with individuals and teams to complete tasks and solve business related problems and demonstrate initiative, courtesy, loyalty, honesty, cooperation, and punctuality as a team member.	MAFS.912.MP.1.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6	SC.912.N.1.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.L.3.4, 3.6	
19.0 Perform e-mail activities. – The student will be able to:		
19.01 Describe e-mail capabilities and functions.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
19.02 Identify components of an e-mail message.		
19.03 Identify the components of an e-mail address.		
19.04 Identify when to use different e-mail options.		
19.05 Attach a file to an e-mail message.		
19.06 Forward an e-mail message.		
19.07 Use an address book.		
19.08 Reply to an e-mail message.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
19.09 Use the Internet to perform e-mail activities.		
19.10 Identify the appropriate use of e-mail and demonstrate related e-mail etiquette.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.11	Identify when to include information from an original e-mail message in a response.		
19.12	Identify common problems associated with widespread use of e-mail.		
20.0	Demonstrate proficiency in using presentation software and equipment. – The student will be able to:		
20.01	Produce a presentation that includes music, animation, and digital photography and present it using a projection system.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
20.02	Using presentation software, create a multimedia presentation that incorporates shot and edited video, animation, music, narration and adheres to good design principles, use of transitions, and effective message conveyance.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
20.03	Demonstrate knowledge of the roles and responsibilities of a multimedia production team (e.g. project manager, creative or design director, content experts, writers, graphic designers, animators, sound designers, videographer, interface designers/programmers).	LAFS.910.L.3.6 LAFS.1112.L.3.6	
20.04	Collaborate with team members to plan, edit, evaluate, and present a multimedia presentation where individuals on the team function in specific production roles.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4	SC.912.N.1.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
20.05 Create a self-running presentation with synchronized audio, convert presentation slides (e.g. PowerPoint) into streaming ASF files for use on the Web.		
21.0 Perform decision-making activities in a multimedia environment. – The student will be able to:		
21.01 Determine work priorities, the audience, project budgets, project specifications, and the production schedule.		
21.02 Evaluate and select appropriate software packages and multimedia tools to complete assigned tasks.		SC.912.N.4.2
21.03 Present and defend design projects.	MAFS.912.MP.3.1	SC.912.N.1.1
21.04 Evaluate criteria for selecting an operating system.	MAFS.912. N-Q 1.3 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1
22.0 Demonstrate language arts knowledge and skills. – The student will be able to:		
22.01 Locate, comprehend and evaluate key elements of oral and written information.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1
22.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
22.03 Present information formally and informally for specific purposes and audiences.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	SC.912.N.1.1
23.0 Demonstrate mathematics knowledge and skills. – The student will be able to:		
23.01 Demonstrate knowledge of arithmetic operations.	MAFS.912.N-RN.2.3	
23.02 Analyze and apply data and measurements to solve problems and interpret documents.	MAFS.912.S-IC.2.6 MASF.912.S-ID.2.6	
23.03 Construct charts/tables/graphs using functions and data.	MASF.912.S-ID.1.1 MASF.912.F-IF.1.1 MASF.912.F-IF.2.4 MASF.912.F-IF.2.5	
24.0 Demonstrate science knowledge and skills. – The student will be able to:		
24.01 Discuss the role of creativity in constructing scientific questions, methods and explanations.		SC.912.N.1.7
24.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.	MAFS.912.S-IC.2.6	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Web Technologies**
Course Number: **9003420**
Course Credit: **1**

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Applied Information Technology.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
	01.04	Range of Reading and Level of Text Complexity	
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Applied Information Technology.		
	02.01	Text Types and Purposes	
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.02	Production and Distribution of Writing	
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a	

Florida Standards			Correlation to CTE Program Standard #
		question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04 Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Applied Information Technology.		
	03.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
	03.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
	03.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
	03.04 Model with mathematics. MAFS.K12.MP.4.1		
	03.05 Use appropriate tools strategically. MAFS.K12.MP.5.1		
	03.06 Attend to precision. MAFS.K12.MP.6.1		
	03.07 Look for and make use of structure. MAFS.K12.MP.7.1		
	03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
18.0	Demonstrate proficiency on the principles of design. – The student will be able to:		
18.01	Identify industry best practices in visual design (e.g., color schemes, fonts, navigation methods, pagination).	MAFS.912.N-Q.1.1, MAFS.912.A-REI.1.1	SC.912.N.1.1
18.02	Explain the key concepts of meeting client needs.	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.1.6
18.03	Apply the principles of Human Computer Interface (HCI) to design and develop an effective look and feel for a website.		SC.912.N.1.1, SC.912.N.1.3, SC.912.N.1.7
18.04	Design and create a webpage for optimal display in multiple browsers.		SC9.12.N.1.1
19.0	Demonstrate proficiency planning an effective website. – The student will be able to:		
19.01	Compare and contrast site maps and wireframes.		SC.912.N.1.5, SC.912.N.1.6
19.02	Develop an effective site map for a website.		SC.912.N.1.1
19.03	Create page layout wireframes for a website.		SC.912.N.1.1
20.0	Demonstrate proficiency formulating a website. – The student will be able to:		
20.01	Classify web development tasks according to when they are performed during the web development cycle.		SC.912.N.1.1, SC.912.N.1.2, SC.912.N.1.4
20.02	Describe the different types of business requirements that apply to website design.		SC.912.N.1.2, SC.912.N.1.5
20.03	Design business requirements to help ensure success for a specific website.		SC.912.N.1.2, SC.912.N.1.3
20.04	Demonstrate ability to use effective designer-client communication skills.		SC.912.N.1.1
21.0	Demonstrate proficiency using web development tools and techniques. – The student will be able to:		
21.01	Compare and contrast writing HTML using a text editor versus using a WYSIWYG editor.		SC.912.N.1.5
21.02	Design and create an effective web page template.		SC.912.N.1.1, SC.912.N.1.7
21.03	Create attractive, engaging, and efficient web pages using a WYSIWYG editor.		SC.912.N.1.1, SC.912.N.1.7
21.04	Create an appropriate directory structure, naming convention protocol, and file organization for a website.		SC.912.N.1.1
21.05	Create DHTML and XML documents using editors or converters.		SC.912.N.1.1, SC.912.N.1.7

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
22.0	Demonstrate proficiency using specialized web design software. – The student will be able to:		
22.01	Compare and contrast various specialized web design software (e.g., Flash, Photoshop, Dreamweaver).		SC.912.N.1.5, SC.912.N.1.7
22.02	Demonstrate proficiency using various specialized web design software (e.g., Flash, Photoshop, Dreamweaver).		SC.912.N.1.1
23.0	Demonstrate proficiency gathering and preparing web content. – The student will be able to:		
23.01	Characterize effective writing styles and conventions for the web.		SC.912.N.1.2, SC.912.N.1.1
23.02	Create effective written content for the web.		SC.912.N.1.7
23.03	Prepare various types of graphical content for use on a webpage.		SC.912.N.1.1
23.04	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).		SC.912.N.1.1, SC.912.N.1.4
23.05	Create and edit images using image or graphic design software.		SC.912.N.1.7, SC912.N.1.1
23.06	Compare and contrast static versus dynamic web content.		SC.912.N.1.6, SC.912.N.1.4, SC.912.N.1.5
24.0	Demonstrate an awareness of preparing a website for launch. – The student will be able to:		
24.01	Evaluate a website for basic usability and accessibility issues.	MAFS.912.S-IC.2.6	SC.912.N.1.3, SC.912.N.1.1
24.02	List the steps that are necessary to determine when a website is ready to launch.	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.1.2, SC.912.N.4.1
24.03	Develop a User Testing Plan.		SC.912.N.1.1
24.04	Demonstrate the ability to organize and execute a user testing of a website.		
24.05	Demonstrate proficiency in publishing to the Internet.		SC.912.N.4.1, SC.912.N.4.2
25.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
25.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.	MAFS.912.REI.1.1	SC.912.N.4.1, SC.912.N.4.2
25.02	Locate, organize and reference written information from various sources.	MAFS.912.REI.1.1	SC.912.N.1.4
25.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	MAFS.912.REI.1.1	SC.912.N.4.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	25.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.	MAFS.912.N-Q.1.1	SC.912.N.1.1, SC.912.N.1.7
	25.05 Apply active listening skills to obtain and clarify information.	MAFS.912.N-Q.1.1	
	25.06 Develop and interpret tables and charts to support written and oral communications.	MAFS.912.F-IF.3.7	SC.912.N.1.1
	25.07 Exhibit public relations skills that aid in achieving customer satisfaction.	MAFS.912.N-Q.1.1	SC.912.N.4.1, SC.912.N.4.2
26.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	26.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.1.2
	26.02 Employ critical thinking and interpersonal skills to resolve conflicts.	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.1.2
	26.03 Identify and document workplace performance goals and monitor progress toward those goals.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	26.04 Conduct technical research to gather information necessary for decision-making.	MAFS.912.S-IC.2.6, MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.1.4

Florida Department of Education
Student Performance Standards

Course Title: **IT Systems and Applications**
Course Number: **9003430**
Course Credit: **1**

Florida Standards			Correlation to CTE Program Standard #
27.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Applied Information Technology.		
27.01	Key Ideas and Details		
	27.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	27.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	27.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
27.02	Craft and Structure		
	27.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	27.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	27.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
27.03	Integration of Knowledge and Ideas		
	27.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	

Florida Standards			Correlation to CTE Program Standard #
	27.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	27.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
27.04	Range of Reading and Level of Text Complexity		
	27.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	27.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
28.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Applied Information Technology.		
28.01	Text Types and Purposes		
	28.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	28.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
28.02	Production and Distribution of Writing		
	28.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	28.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	28.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
28.03	Research to Build and Present Knowledge		
	28.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow	

Florida Standards			Correlation to CTE Program Standard #
		or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	28.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	28.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
28.04	Range of Writing		
	28.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
29.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Applied Information Technology.		
29.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
29.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
29.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
29.04	Model with mathematics. MAFS.K12.MP.4.1		
29.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
29.06	Attend to precision. MAFS.K12.MP.6.1		
29.07	Look for and make use of structure. MAFS.K12.MP.7.1		
29.08	Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
30.0 Explain motherboard components, types and features. – The student will be able to:		
30.01 Identify different motherboard form factors (ATX/BTX and micro ATX).		
30.02 Identify input/output interfaces (e.g. USB, serial and NIC).		
30.03 Identify the different types of bus slots (e.g. PCI, AGP, PCMCIA).		
30.04 Identify the BIOS/CMOS/Firmware (e.g. POST, CMOS battery).		
31.0 Explain the purpose and characteristics of CPUs and their features. – The student will be able to:		
31.01 Identify types of CPUs (e.g. AMD Intel).		
31.02 Define hyper threading.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
31.03 Explain multi core (e.g. dual, triple, quad).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
31.04 Explain the difference between onboard cache (e.g. L1, L2, L3).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
31.05 Compare and contrast between real and actual speed.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
31.06 Compare and contrast between 32 bit and 64 bit processing.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
32.0 Perform installation and configuration activities. – The student will be able to:		
32.01 Install and configure software including device drivers.		
32.02 Install and configure operating system software.		
32.03 Install and configure application software.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
32.04	Install and configure peripherals including device drivers (e.g., scanners, cameras, printers).		
32.05	Supervise the testing of operating system management systems (e.g., registry, INI files).		
32.06	Prepare the hard disk and related issues for operating system installation (e.g., BIOS, disk controllers).		
32.07	Format and partition the hard disk.		
32.08	Verify the proper operation of the system (e.g., physical inspection, tests, utilities).		
32.09	Compare and contrast memory technologies (e.g., RAM, ROM, virtual memory, memory management).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
32.10	Demonstrate proficiency using various memory technologies (e.g., RAM, ROM, virtual memory, memory management).		
32.11	Demonstrate proper use of user interfaces, command utilities, and troubleshooting utilities.		
32.12	Explain the basics of boot sequences, methods and startup utilities.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
33.0	Demonstrate proficiency using computer networks. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
33.01 Compare and contrast various implementation models (e.g., TCP/IP protocols, OSI 7, IPX, cross mapping of protocols).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
33.02 Describe an Ethernet network and the use of CSMA\CD.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
34.0 Perform the process for problem diagnostics and problem resolution through wireless, infrared, telephone, e-mail, remote access, or direct contact. – The student will be able to:		
34.01 Identify, troubleshoot and propose solutions for configuration problems.	MAFS.912.MP.1.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
34.02 Identify, troubleshoot and propose solutions for software problems.	MAFS.912.MP.1.1 LAFS.910.RL.2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
34.03 Identify, troubleshoot and propose solutions for hardware malfunctions.	MAFS.912.MP.1.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
34.04 Identify, troubleshoot and propose solutions for network malfunctions.	MAFS.912.MP.1.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
34.05 Plan and implement a system upgrade and downgrade.	MAFS.912.MP.1.1	
34.06 Evaluate data recovery using various techniques (e.g., MBR repair tools, rescue disks, disk image, backup).	MAFS.912.S-MD.2.5B	SC.912.N.4.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
34.07 Organize and perform system maintenance activities (e.g., management console, SNMP, system monitors, diagnostics, virus management).		
34.08 Demonstrate corporate interaction proficiency (e.g., responsibility, interaction, communication).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
35.0 Demonstrate knowledge of presentation production issues. – The student will be able to:		
35.01 Demonstrate knowledge of copyright laws including copyright statute, disclaimers, and filing procedure.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
35.02 Demonstrate an understanding of graphic and other file formats (e.g., EPS, TIFF, JPEG, ASCII, MPEG, MIDI, AVI, WAV) and knowledge of image size when scanning and saving files for use in different presentation types (Web, computer, print).	MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.2 MASF.912.N-Q.1.3 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
35.03 Identify display device connectors and types (e.g. VGA, HDMi, and S-Video).		
35.04 Define refresh rate, resolution, multi-monitor and Degauss.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
35.05 Demonstrate knowledge of presentation vocabulary/terms.	LAFS.910.L.3.6 LASF.1112.L.3.6	
35.06 Compare and contrast and utilize various audio/video output solutions and devices (e.g., DVD, CD-Rom, web).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
35.07 Compare and contrast removable storage (tape drive, thumb drive, flash drive, USB, external CD-RW and external hard drive).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.L.3.4, 3.6	
36.0 Demonstrate proficiency using computer networks. – The student will be able to:		
36.01 Define networking and describe the purpose of a network.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
36.02 Describe the conceptual background of digital networks including terminology and basics.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
36.03 Describe various types of networks and the advantages and disadvantages of each (e.g. peer to peer, client/server, mainframe/terminal).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
36.04 Describe the use, advantages, and disadvantages of various network media (e.g. thinnet cable, coaxial, twisted pair (cat 5), fiber optics).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
36.05 Describe the function of various network devices (e.g. hub, switched hub or switch, router bridge, gateway, access points).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
36.06 Describe the difference between the internet and intranet.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
36.07 Compare and contrast IP Version 6 and IP Version 4.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
36.08 Compare and contrast the different network types (e.g. broadband, wireless, Bluetooth, cellular).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
37.0 Demonstrate proficiency communicating over the Internet. – The student will be able to:		
37.01 Display understanding of how Internet Service Providers (ISP) operates and what role they play in enabling users to connect to the Internet.		
37.02 Explain how the Internet works and how documents are connected and transferred.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
37.03 Configure an email client for SMTP and POP3 servers, including port assignment.		
37.04 Explain how the primary modes of Internet communication are used.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
38.0 Demonstrate proficiency in troubleshooting, repair and maintenance of computers. – The student will be able to:		
38.01 Determine the troubleshooting methods and tools for printers.	MAFS.912.MP.1.1 LAFS.910.RI.3.7 LAFS.1112.RI.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.L.3.6 LAFS.1112.L.3.6 LAFS.910.SL.2.4 LAFS.1112.SL.2.4	
38.02 Explain and interpret common laptop issues and basic troubleshooting methods.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
38.03 Integrate common preventative maintenance techniques.		
39.0 Demonstrate proficiency in the basic principles of security concepts and technologies. – The student will be able to:		
39.01 Evaluate encryption technologies, software firewall, authentication technologies, and data security.	MAFS.912.S-IC.2.5 MAFS.912.S.IC.2.6 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6,	SC.912.N.4.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	39.02 Summarize the following security features (e.g. wireless encryption, malicious software protection and BIOS security, password management and biometrics).	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
40.0	Demonstrate proficiency in operational procedures as they relate to computer equipment and components. – The student will be able to:		
	40.01 Compare and contrast ESD, EMI, RFI, and electrical safety.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
	40.02 Demonstrate proficiency in the use of state regulations for hazardous materials (e.g. MSDS).	LAFS.910.RI.1.3 LAFS.1112.RI.1.3	
41.0	Use information technology tools. – The student will be able to:		
	41.01 Use personal information management (PIM) applications to increase workplace efficiency.	LAFS.910.W.3.8 LAFS.1112.W.3.8	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
41.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.	MAFS.912.MP.5.1 MAFS.912.S-ID.1.2 LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2	
41.03 Employ computer operations applications to access, create, manage, integrate, and store information.	MAFS.912.MP.5.1 LAFS.910.L.3.6 LAFS.1112.L.3.6	
41.04 Employ collaborative/groupware applications to facilitate group work.	LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.W.1.2 LAFS.1112.W.1.2 LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
42.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:		
42.01 Describe the nature and types of business organizations.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
42.02 Explain the effect of key organizational systems on performance and quality.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
42.03 List and describe quality control systems and/or practices common to the workplace.	MAFS.912.S-MD.2.7 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
42.04 Explain the impact of the global economy on business organizations.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
43.0 Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
43.01 Evaluate and justify decisions based on ethical reasoning.	MAFS.912.S-MD.2.5 MASF.912.MP.3.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
43.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	MASF.912.MP.1.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
43.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	
43.04 Interpret and explain written organizational policies and procedures.	MASF.912.MP.3.1 LAFS.910.RL.2.4 LAFS.1112.RL.2.4 LAFS.910.RI.1.1, 2.4 LAFS.1112.RI.1.1, 2.4 LAFS.910.W.1.2, 2.4, 2.6, 3.8 LAFS.1112.W.1.2, 2.4, 2.6, 3.8 LAFS.910.SL.1.1, 1.2, 2.4 LAFS.1112.SL.1.1, 1.2, 2.4 LAFS.910.L.3.4, 3.6 LAFS.1112.L.3.4, 3.6	

Florida Department of Education
Student Performance Standards

Course Title: **Database Essentials**
Course Number: **9003440**
Course Credit: **1**

Florida Standards			Correlation to CTE Program Standard #
27.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Applied Information Technology.		
27.01	Key Ideas and Details		
	27.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	27.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	27.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
27.02	Craft and Structure		
	27.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	27.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	27.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
27.03	Integration of Knowledge and Ideas		
	27.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	

Florida Standards			Correlation to CTE Program Standard #
	27.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	27.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
27.04	Range of Reading and Level of Text Complexity		
	27.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	27.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
28.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Applied Information Technology.		
28.01	Text Types and Purposes		
	28.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	28.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
28.02	Production and Distribution of Writing		
	28.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	28.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	28.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
28.03	Research to Build and Present Knowledge		
	28.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow	

Florida Standards			Correlation to CTE Program Standard #
		or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	28.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	28.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
28.04	Range of Writing		
	28.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
29.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Applied Information Technology.		
29.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
29.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
29.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
29.04	Model with mathematics. MAFS.K12.MP.4.1		
29.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
29.06	Attend to precision. MAFS.K12.MP.6.1		
29.07	Look for and make use of structure. MAFS.K12.MP.7.1		
29.08	Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1		

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
44.0	Develop an awareness of the changes taking place in the information age and how they fit into an evolving society. – The student will be able to:		
44.01	Describe the role a database plays in a business and predict its evolution.		SC.912.N.1.1, SC.912.N.1.2
44.02	Demonstrate the difference between “data” and “information.”	MAFS.912.S-ID.2.5	SC.912.N.1.1, SC.912.N.1.2, SC.912.N.1.4
44.03	Understand the importance of clear communication when discussing business informational requirements.	MAFS.912.S-IC.2.3	SC.912.N.1.1, SC.912.N.4.1
44.04	Experiment with web-based email and explain how these services use a database.	MAFS.912.S-IC.2.3	SC.912.N.1.1
45.0	Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs. – The student will be able to:		
45.01	Identify and analyze the phases of the database development process.	MAFS.912.S-IC.2.4	SC.912.N.1.1, SC.912.N.1.2
45.02	Explain what conceptual data modeling and database design involves.		SC.912.N1.1, SC.912.N.3.5
45.03	Compare database development process with that of the application development process.	MAFS.912.S-IC.2.5	SC.912.N.1.5
45.04	Identify the need for databases and why they are used.	MAFS.912.S-IC.2.3	SC.912.N.1.4
45.05	Explain the various types of databases (i.e., flat file, relational) and the appropriate use of each.	MAFS.912.G-GMD.1.1	SC.912.N.1.5
45.06	Demonstrate proficiency in design methodology by completing appropriate tasks during the appropriate time of the developmental life cycle.		SC.912.N.1.1, SC.912.N.1.2
45.07	Demonstrate proficiency in design methodology by considering where the database will reside.		SC.912.N.1.1, SC.912.N.1.2
46.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:		
46.01	Identify and model various types of entities.	MAFS.912.F-IF.2.4	SC.912.N.1.1, SC.912.N.3.5
46.02	Identify naming and drawing conventions for entities.	MAFS.912.N-Q.1.2	SC.912.N.1.2
46.03	Sequence the steps that are necessary for creation of an entity.	MAFS.912.A-REI.1.1	SC.912.N.1.1
46.04	Analyze and model the relationships between entities.	MAFS.912.F-BF.1.1	SC.912.N.3.5
47.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:		
47.01	Analyze and model attributes.	MAFS.912.N-Q.1.2	SC.912.N.3.5

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	47.02 Identify unique identifiers for each entity.	MAFS.912.N-Q.1.2	SC.912.N.1.4
	47.03 Develop an entity relationship diagram tagging attributes with optionality.	MAFS.912.N-VM.3.6, MAFS.912.S-ID.2.5	SC.912.N.1.1, SC.912.N.3.5
48.0	Consider the degree and optionality of relationships of entities. – The student will be able to:		
	48.01 Create models and entity relationship information requirements and interviews.		SC.912.N.3.5
	48.02 Begin to differentiate between one-to-many, many-to-many and one-to-one relationships.	MAFS.912.F-IF.1.1	SC.912.N.1.5
	48.03 Identify relationship between two entities by reading a given diagram.	MAFS.912.F-IF.2.4	SC.912.N.1.4, SC.912.N.1.6
	48.04 Create a relationship between instances of the same entity.		SC.912.N.1.4, SC.912.N.1.6
	48.05 Read an entity relationship model in order to validate it.		SC.912.N.1.4, SC.912.N.1.6
49.0	Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams. – The student will be able to:		
	49.01 Identify the significance of an attribute that has more than one value for each entity instance.	MAFS.912.F-IF.1.3	SC.912.N.1.4
	49.02 Evaluate appropriate methods of storing validation rules for attributes.	MAFS.912.F-IF.1.2	SC.912.N.1.2
	49.03 Recognize unique identifiers inherited from other entities.	MAFS.912.S-IC.1.1	SC.912.N.1.3
	49.04 Sequence the steps involved in resolving a many-to-many relationship.	MAFS.912.A-REI.1.1	SC.912.N.1.6
50.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:		
	50.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).		SC.912.N.1.4
	50.02 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.	MAFS.912.A-CED.1.3, MAFS.912.F-IF.1.3	SC.912.N.3.5
	50.03 Enforce referential integrity.	MAFS.912.A-REI.1.1	SC.912.N.1.4
51.0	Apply the complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:		
	51.01 Describe a relational database and how it is different from other database systems.		SC.912.N.1.2
	51.02 Define primary keys and foreign keys and describe their purpose.	MAFS.912.S-CP.1.1	SC.912.N.1.2
	51.03 Describe what data integrity refers to and list some constraints.	MAFS.912.A-REI.1.1	SC.912.N.1.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	51.04 Explain how database design fits into the database development process.		SC.912.N.1.2
	51.05 Translate an entity-relationship model into a relational database design.		SC.912.N.1.2
52.0	Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved. – The student will be able to:		
	52.01 Recognize raw data and evaluate the steps for creating a data group in unnormalized form (UNF).	MAFS.912.S-IC.2.6	SC.912.N.1.3
53.0	Manipulating data. – The student will be able to:		
	53.01 Determine appropriate data inputs and outputs for an existing database.	MAFS.912.F-IF.1.1	
	53.02 Demonstrate proficiency in record management (i.e., entering, editing, finding, selecting, sorting, deleting records).		SC.912.N.1.1
	53.03 Change the layout of a datasheet.	MAFS.912.N-RN.1.2	SC.912.N.1.7
	53.04 Create forms, reports, mailing labels, and charts using a database.	MAFS.912.N-RN.1.2	SC.912.N.1.7
	53.05 Export data to appropriate software applications.		SC.912.N.1.1, SC.912.N.1.3
	53.06 Demonstrate proficiency in coordinating databases with appropriate software applications.		SC.912.N.1.1
54.0	Building and modifying tables. – The student will be able to:		
	54.01 Create a database table.	MAFS.912.A-CED.1.2, MAFS.912.F-IF.3.7	SC.912.N.1.1
	54.02 Create table structures and establish table relationships.	MAFS.912.A-CED.1.2, MAFS.912.F-IF.3.7	SC.912.N.1.1
	54.03 Determine fields and assign data types in a database table.	MAFS.912.F-IF.1.1, MAFS.912.F-IF.3.7	SC.912.N.1.1
	54.04 Demonstrate appropriate manipulation of database tables (i.e., enter data, add and delete records).	MAFS.912.F-IF.3.7, MAFS.912.F-BF.2.3	SC.912.N.1.1
	54.05 Modify a database table by adding, deleting, and removing fields.	MAFS.912.F-IF.3.7, MAFS.912.F-BF.2.3	SC.912.N.1.1, SC.912.N.1.5, SC.912.N.1.6
	54.06 Demonstrate proficiency in the appropriate use of database wizards.	MAFS.912.F-IF.3.7	SC.912.N.1.1
55.0	Performing queries and filtering records. – The student will be able to:		
	55.01 Design a query and extract specific data from a database table.	MAFS.912.G-SRT.2.4	SC.912.N.1.7
	55.02 Create a calculated field.	MAFS.912.A-REI.4.10	SC.912.N.1.7

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	55.03 Filter data in records by selection and by form.		SC.912.N.1.1
	55.04 Modify a saved query.		SC.912.N.1.1
56.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:		
	56.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.		SC.912.N.1.1
	56.02 Explain emergency procedures to follow in response to workplace accidents.	MAFS.912.REI.1.1	SC.912.N.1.1
	56.03 Create a disaster and/or emergency response plan.	MAFS.912.REI.1.1	SC.912.N.1.1, SC.912.N.1.7
57.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
	57.01 Employ leadership skills to accomplish organizational goals and objectives.		SC.912.N.4.2
	57.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		SC.912.N.4.2
	57.03 Conduct and participate in meetings to accomplish work tasks.		SC.912.N.4.2
	57.04 Employ mentoring skills to inspire and teach others.		SC.912.N.4.2
58.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:		
	58.01 Identify and demonstrate positive work behaviors needed to be employable.		
	58.02 Develop personal career plan that includes goals, objectives, and strategies.		
	58.03 Examine licensing, certification, and industry credentialing requirements.		
	58.04 Maintain a career portfolio to document knowledge, skills, and experience.		
	58.05 Evaluate and compare employment opportunities that match career goals.		
	58.06 Identify and exhibit traits for retaining employment.		
	58.07 Identify opportunities and research requirements for career advancement.		
	58.08 Research the benefits of ongoing professional development.		
	58.09 Examine and describe entrepreneurship opportunities as a career planning option.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
59.0 Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:		
59.01 Identify and describe the services and legal responsibilities of financial institutions.		
59.02 Describe the effect of money management on personal and career goals.		
59.03 Develop a personal budget and financial goals.		
59.04 Complete financial instruments for making deposits and withdrawals.		
59.05 Maintain financial records.		
59.06 Read and reconcile financial statements.		
59.07 Research, compare and contrast investment opportunities.		

Florida Department of Education
Student Performance Standards

Course Title: **Programming Essentials**
Course Number: **9003450**
Course Credit: **1**

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
60.0 Plan program design. – The student will be able to:		
60.01 Formulate a plan to determine program specifications individually or in groups.	MAFS.912.A-REI.1.1	SC.912.N.1.1
60.02 Use a graphical representation or pseudocode to represent the structure in a program or subroutine.	MAFS.912.S-CP.1.5, MAFS.912.REI.1.1, MAFS.912.S-CP.1.1	SC.912.N.1.1, SC.912.N.1.2
60.03 Design programs to solve problems using problem-solving strategies.	MAFS.912.A-CED.1.2	SC.912.N.1.1, SC.912.N.1.2
60.04 Prepare proper input/output layout specifications.	MAFS.912.F-IF.1.1	SC.912.N.1.1, SC.912.N.1.2
60.05 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.1.2
60.06 Analyze problem statements.	MAFS.912.S-MD.2.7	SC.912.N.1.1, SC.912.N.1.2
60.07 Determine what kind of information the desired program must process.	MAFS.912.S-MD.1.1	SC.912.N.1.1, SC.912.N.1.2
60.08 Formulate concise descriptions of a program's task and purpose.	MAFS.912.S-CP.1.1	SC.912.N.1.1, SC.912.N.1.2
60.09 Formulate concise descriptions of task and purpose of a program's pieces.	MAFS.912.S-CP.1.1	SC.912.N.1.1, SC.912.N.1.2
60.10 Organize programs according to the problem analysis.	MAFS.912.A-CED.1.3	SC.912.N.1.1, SC.912.N.1.2
60.11 Recognize changes in the problem statement.	MAFS.912.F-LE.1.1	SC.912.N.1.1, SC.912.N.1.2
60.12 Suggest changes in the program organization.		SC.912.N.1.1, SC.912.N.1.2

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
61.0 Code programs. – The student will be able to:		
61.01 Write programs according to recognized programming standards.		SC.912.N.1.1
61.02 Write internal documentation statements as needed in the program source code.		SC.912.N.1.1
61.03 Code programs using logical statements (e.g., If-Then-Else, Do..While).		SC.912.N.1.1, SC.912.N.1.3
61.04 Enter and modify source code using a program language editor.		SC.912.N.1.1
61.05 Code routines within programs that validate input data.		SC.912.N.1.1
61.06 Code programs using object-oriented languages (techniques).		SC.912.N.1.1
61.07 Select the essential aspects of a problem statement.		SC.912.N.1.1
61.08 Provide a solution to a problem.	MAFS.912.A-REI.1.1, MAFS.912.A-REI.2.3	SC.912.N.1.1
61.09 Find solutions to an extended problem statement.	MAFS.912.A-REI.1.1, MAFS.912.A-REI.2.3	SC.912.N.1.1
61.10 Utilize reference manuals and help systems.	MAFS.912.G-CO.1.1	SC.912.N.1.1
61.11 Use pre-defined functions within programs.	MAFS.912.F-TF.3.8, MAFS.912.F-TF.3.9	SC.912.N.1.1
62.0 Test programs. – The student will be able to:		
62.01 Develop a plan for testing programs.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.02 Develop data for use in program testing.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.03 Perform debugging activities.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.04 Distinguish among the different types of program and design errors.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.05 Evaluate program test results.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.06 Execute programs and subroutines as they relate to the total application.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
62.07 Develop examples that illustrate the core behavior of each program.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.08 Develop examples that illustrate the core behavior of each program component.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.09 Illustrate the behavior of boundary cases.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.10 Demonstrate an understanding that engineering artifacts requires rigorous and systematic testing.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.11 Use examples to show that the solution meets pre-determined criteria.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.12 Demonstrate understanding that testing can expose problems but not prove the correctness of the design in an absolute sense.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
62.13 Compile (interpret) and run programs.	MAFS.912.S-MD.1.3,1.4 MAFS.912.S-MD.2.5, 2.6, 2.7	SC.912.N.1.1
63.0 Perform program maintenance. – The student will be able to:		
63.01 Analyze output to identify and annotate errors or enhancements.	MAFS.912.S-MD.2.5	SC.912.N.1.1, SC.912.N.1.3
64.0 Create and maintain documentation. – The student will be able to:		
64.01 Follow established documentation standards.	MAFS.912.N-Q.1.1	SC.912.N.1.1
65.0 Develop an awareness of software quality assurance. – The student will be able to:		
65.01 Identify the legal and social consequences of errors in software.		SC.912.N.4.2
65.02 Describe copyright and other laws that relate to software theft and misuse.		SC.912.N.4.2
65.03 Describe software security measures to protect computer systems and data from unauthorized use and tampering (e.g., physical security, passwords, virus protection/prevention).		SC.912.N.4.2
66.0 Develop an understanding of programming techniques and concepts. – The student will be able to:		
66.01 Identify the basic constructs used in structured programming.	MAFS.912.A-REI.1.1	SC.912.N.1.4

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
67.0	Design structured programs. – The student will be able to:		
67.01	Design programs that model mathematical relationships from application areas (e.g., accounting, economics, multimedia, programming, science, web).	MAFS.912.A-REI.4.11, MAFS.912.F-IF.3.7	SC.912.N.3.5
67.02	Design programs that deal with multi-faceted objects (e.g., personnel records, physical objects, attributes of HTML tags).	MAFS.912.G-MG.1.3	SC.912.N.1.1
67.03	Design programs that deal with mixed classes of objects (e.g., a class of geometric shapes containing circles, rectangles, triangles, squares, polygons).	MAFS.912.G-MG.1.1	SC.912.N.1.1
67.04	Design programs that deal with objects of undetermined size (e.g., shopping lists, family trees, file directories on computers, websites).	MAFS.912.S-MD.1.4	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Web Development Technologies**
Course Number: **9003460**
Course Credit: **1**

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
68.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:		
68.01	Identify and convert graphic formats.	MAFS.912.N-Q.1.1	SC.912.N.1.4
68.02	Demonstrate proficiency in adding Java scripts to web pages.	MAFS.912.A-REI.1.1	SC.912.N.1.2
69.0	Demonstrate proficiency in web page design applicable to the WWW. – The student will be able to:		
69.01	Determine the objectives and the audience for Web pages.	MAFS.912.C.2.6	SC.912.N.1.4, SC.912.N.1.7
69.02	Identify design strategies to reach and keep an audience.		SC.912.N.1.4, SC.912.N.1.7, SC,912.N.1.2
69.03	Use storyboarding to plan a website.	MAFS.912.F-IF.3.7	SC.912.N.1.1
69.04	Create styles and other design elements (e.g. backgrounds, colors, fonts, buttons).		SC.912.N.1.7
70.0	Demonstrate proficiency in using a WYSIWG editor, web design, or web animation software for web page design. – The student will be able to:		
70.01	Apply style sheets for consistent website design.	MAFS.912.N-Q.1.1	SC.912.N.1.3
70.02	Create and edit images and photographs for Web pages using digital imaging software (e.g., ImageReady in Photoshop).	MAFS.912.G-MG.1.3, MAFS.912.A-REI.1.1	SC.912.N.1.7
70.03	Insert audio files into a Web page.	MAFS.912.G-MG.1.3, MAFS.912.A-REI.1.1	
70.04	Create, edit and integrate video files into a Web page.	MAFS.912.G-MG.1.3, MAFS.912.A-REI.1.1	SC.912.N.1.7
70.05	Create, edit and integrate animation files into a Web page.	MAFS.912.G-MG.1.3, MAFS.912.A-REI.1.1	SC.912.N.1.7

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
70.06	Demonstrate an understanding of photograph compression factors such as transmission speed, color reduction, and browser support.	MAFS.912.N-Q.1.1	SC.912.N.1.2, SC.912.N.1.6
70.07	Demonstrate knowledge of image formats related to photos and graphics on the Internet (e.g. Graphic formats (TIFF & EPS), Web formats (JPEG, GIF, PNG).	MAFS.912.N-Q1.1	SC.912.N.1.2, SC.912.N.1.6
70.08	Save and export a photograph to the Web in the format best for image quality and file size.		
70.09	Build, optimize, edit, and test web pages for publication.	MAFS.912.G-MG.1.3, MAFS.912.A-REI.1.1	SC.912.N.1.7, SC.912.N.3.5
70.10	Create a web page that utilizes plug-ins.	MAFS.912.G-MG.1.3, MAFS.912.A-REI.1.1	SC.912.N.1.7
70.11	Demonstrate an understanding of network and web implementation issues (e.g., bandwidth, compression, streaming).	MAFS.912.N-Q.1.1	SC.912.N.1.2
70.12	Compare and contrast various methods by which information may be accessed on the Internet/Intranet (e.g., FTP, telnet, browser).	MAFS.912.G-SRT.1.2	SC.912.N.1.5, SC.912.N.1.6
70.13	Demonstrate an understanding of file encryption methods (e.g., secure server, unsecured server).	MAFS.912.N-Q.1.1	SC.912.N.1.2
71.0	Demonstrate proficiency in using digital photography and digital imaging. – The student will be able to:		
71.01	Demonstrate knowledge of ethics related to digital imaging and legal and consent issues.	MAFS.912.N-Q.1.1	SC.912.N.1.2, SC.912.N.4.2
71.02	Apply effective design principles in digital photography compositions.		SC.912.N.1.1
71.03	Illustrate the essence of an event, quote, or slogan through digital photography/imaging.		SC.912.N.1.7
71.04	Demonstrate skill in using digital imaging software for image manipulation, color correction, and special effects to creatively convey a message or literary interpretation.	MAFS.912.N-Q.1.1	SC.912.N.1.2, SC.912.N.1.1
71.05	Demonstrate skill in scanning and cropping photographs.	MAFS.912.N-Q.1.1	SC.912.N.1.2. SC.912.N.1.1
72.0	Design and create webpages suitable for publishing to the Internet. – The student will be able to:		
72.01	Explain the need for web-based applications.	MAFS.912.A-REI.1.1	SC.912.N.1.2
72.02	Evaluate a website for basic usability and accessibility issues.	MAFS.912.S-IC.2.6	SC.912.N.1.3
72.03	Display an understanding of the purposes of site maps and wireframes.		SC.912.N.1.1
72.04	Develop an effective site map for a website.	MAFS.912.N-Q.1.1	SC.912.N.1.7
72.05	Develop effective wireframes for a website.	MAFS.912.N-Q.1.1	SC.912.N.1.7
72.06	Identify industry best practices in visual design.		SC.912.N.1.4

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
72.07	Explain the key concepts of meeting client needs.	MAFS.912.A-REI.1.1, MAFS.912.S-IC.2.6	SC.912.N.1.2
72.08	Develop an effective look and feel for a website.	MAFS.912.N-Q.1.1	SC.912.N.1.7
72.09	Develop an effective web page template.	MAFS.912.N-Q.1.1	SC.912.N.1.7
72.10	Describe a correct directory structure, naming convention protocol, and file organization for a website.		SC.912.N.1.2
72.11	Characterize effective writing for the web.		
72.12	Create effective written content for the web.		SC.912.N.1.7
72.13	Decide how to best prepare various types of graphical content for use on a web page.	MAFS.912.A-REI.1.1	SC.912.N.1.1
72.14	Develop a User Testing Plan.	MAFS.912.N-Q.1.1	SC.912.N.1.7, SC.912.N.1.1
72.15	List the steps that are necessary to determine when a website is ready to launch.	MAFS.912.A-REI.1.1	SC.912.N.1.1
72.16	Demonstrate the ability to organize and execute a user testing of a website.	MAFS.912.N-Q.1.1	SC.912.N.1.1
73.0	Describe how website performance is monitored and analyzed. – The student will be able to:		
73.01	Identify issues related to website maintenance.	MAFS.912.S-IC.2.6	SC.912.N.1.4
73.02	Use webpage validation tools.		SC.912.N.1.1
73.03	Describe website performance metrics (e.g., visits, time-on-page, time-on-site) and discuss their design implications.	MAFS.912.S-IC.2.6	SC.912.N.1.2
73.04	Demonstrate knowledge of accessibility problems and solutions.	MAFS.912.A-REI.1.1	SC.912.N.1.1
73.05	Examine indexing, page ranking, basic Search Engine Optimization techniques.	MAFS.912.S-IC.2.6	SC.912.N.1.1
73.06	Explore common website analytic tools.	MAFS.912.S-IC.2.6	SC.912.N.1.1
73.07	Construct web pages with streaming media content.	MAFS.912.S-CP.1.4	SC.912.N.1.7
74.0	Demonstrate proficiency in hosting a website. – The student will be able to:		
74.01	Apply professional guidelines to choose, search for, and register a domain name.	MAFS.912.A-REI.1.1	SC.912.N.1.1
74.02	Evaluate criteria upon which to select an appropriate web host.	MAFS.912.A-REI.1.1	SC.912.N.1.4, SC.912.N.1.6. SC.912.N.1.3
74.03	Make generalizations about optimal download speed for a particular website.	MAFS.912.S-IC.2.6	SC.912.N.1.1, SC.912.N.1.2

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
74.04 Demonstrate the ability to upload and download files using FTP protocol.	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.1.2
74.05 Develop a Maintenance Plan for a client.	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.1.2
75.0 Demonstrate the ability to attract traffic for a website. – The student will be able to:		
75.01 Explain and describe the best practices for attracting traffic to websites.	MAFS.912.A-REI.1.1	SC.912.N.1.2, SC.912.N.1.4
75.02 Evaluate an effective search engine optimization strategy.	MAFS.912.S-IC.2.6	SC.912.N.1.2, SC.912.N.1.4
75.03 Describe tactics for building online credibility.	MAFS.912.A-REI.1.1	SC.912.N.1.2, SC.912.N.1.4
75.04 Explain how to use standard techniques to gather and/or track site statistics.	MAFS.912.A-REI.1.1	SC.912.N.1.2, SC.912.N.1.4

Florida Department of Education
Student Performance Standards

Course Title: **Multimedia Technologies**
Course Number: **9003470**
Course Credit: **1**

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
76.0	Demonstrate knowledge of presentation production issues. – The student will be able to:		
76.01	Identify characteristics of various types of presentations (informing, selling, teaching, entertaining).	MAFS.912.NQ.1.1	
76.02	Identify presentation materials (e.g. handouts, seminar notebooks, business cards, coupons) and presentation marketing mediums (e.g., print media such as newspaper, magazines; TV; movies; computer presentations; interactive CD ROM; kiosks, Web pages).	MAFS.912.NQ.1.1	
76.03	Identify design characteristics (fonts, size and styles, backgrounds) that are suited for each type of presentation format and material.	MAFS.912.G-SRT.1.1; MAFS.912.G-SRT.1.2	
76.04	Demonstrate knowledge of copyright laws including copyright statute, disclaimers, and filing procedures.	MAFS.912.A-REI.1.1 LAFS.1112.W.3.8	
76.05	Research and identify skills needed for career positions in multimedia.	MAFS.912.S-IC.2.6; MAFS.912.N-Q.1.1 LAFS 910 R1.1.1	
76.06	Demonstrate an understanding of graphic and other file formats (e.g., EPS, TIFF, JPEG, ASCII, MPEG, MIDI, AVI, WAV) and knowledge of image size when scanning and saving files for use in different presentation types (web, computer, print).	MAFS.912.G-SRT.1.1	
76.07	Demonstrate knowledge of presentation vocabulary/terms.	MAFS.912.A-REI.1.1 LAFS.910.R1.2.4	
77.0	Demonstrate proficiency in using digital photography and digital imaging. – The student will be able to:		
77.01	Demonstrate knowledge of ethics related to digital imaging and legal and consent issues.	MAFS.912.A-REI.1.1 LAFS.1112.W.3.8	
77.02	Apply effective design principles in digital photography compositions.	MAFS.912.A-REI.4.11	
77.03	Illustrate the essence of an event, quote, or slogan through digital photography/imaging.	MAFS.912.A-REI.1.1; MAFS.912.IF.3.7	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.W.2.6	
	77.04 Demonstrate skill in using digital imaging software for image manipulation, color correction, and special effects to creatively convey a message or literary interpretation.		
	77.05 Demonstrate skill in scanning and cropping photographs.	MAFS.912.G-SRT.1.1	
	77.06 Incorporate scanned or digitally taken photographs into documents (poster, brochure, card, photo journalism story, report or book covers, letterhead) that have been designed using desktop publishing software or the desktop publishing features of word processing software.		
78.0	Demonstrate basic video production. – The student will be able to:		
	78.01 Use current industry standard production video equipment.		
	78.02 Operate camera in studio and location (field) production environments.		
	78.03 Demonstrate understanding of digital video storage concepts and digital storage media.	MAFS.912.A-REI.1.1	
	78.04 Demonstrate knowledge of and the ability to operate digital recording decks, and other digital storage devices.	MAFS.912.A-REI.1.1	
	78.05 Identify and select microphones for production needs.	MAFS.912.N-Q.1.1	
	78.06 Determine appropriate lighting needs for production settings.	MAFS.912.N-Q.1.1	
	78.07 Identify location and studio lighting types, method of use and application.	MAFS.912.N-Q.1.1	
79.0	Demonstrate set-up and configuration of a computer for video applications. – The student will be able to:		
	79.01 Install basic peripheral devices related to video programs.		
	79.02 Install and configure software related to video programs.		
	79.03 Demonstrate basic knowledge of computer system requirements.	MAFS.912.A-REI.1.1	
	79.04 Demonstrate basic knowledge of installing plug-ins or additional audio source material such as beats and or samples.	MAFS.912.A-REI.1.1	
	79.05 Understand the signal flow of a digital video workstation.	MAFS.912.A-REI.1.1	
80.0	Demonstrate the basic operation of a video workstation. – The student will be able to:		
	80.01 Demonstrate knowledge of the digital video workstation interface.	MAFS.912.A-REI.1.1	
	80.02 Demonstrate a working familiarity and understanding of the function and operation of digital video workstations.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
80.03	Describe a full digital media production cycle.	MAFS.912.A-REI.1.1	
80.04	Demonstrate ability to edit, cut, erase, and insert video utilizing various digital production techniques.	MAFS.912.A-REI.1.1	
80.05	Record video directly to the digital video workstation.		
80.06	Demonstrate knowledge of editing video according to message.	MAFS.912.A-REI.1.1	
80.07	Demonstrate skill in using video effects and plug-ins.	MAFS.912.A-REI.1.1	
80.08	Describe a first complete run-through of the video production process.	MAFS.912.A-REI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
80.09	Characterize the qualities of effective communication in a completed video.	MAFS.912.S-IC.2.3	
80.10	Prepare a video project for final compositing and export.		
80.11	Transfer video files between various video software applications.	MAFS.912.F-IF.3.7	
80.12	Export finished video.		
80.13	Identify and describe solutions to the challenges and obstacles that arise in a video production.	MAFS.912.N-Q.1.1	
81.0	Demonstrate basic audio production. – The student will be able to:		
81.01	Describe digital audio storage concepts and digital storage media.	MAFS.912.A-REI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
81.02	Operate digital recording decks and other digital storage devices.		
81.03	Describe the function and operation of digital audio workstations.	MAFS.912.A-REI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
81.04	Edit, cut, erase, and insert sound utilizing various digital production techniques.	MAFS.912.A-REI.1.1	
81.05	Perform digital noise reduction and noise extraction via spectral display.	MAFS.912.F-IF.3.7	
82.0	Set-up and configure a computer for audio applications. – The student will be able to:		
82.01	Install basic peripheral devices related to audio programs.	MAFS.912.A-REI.1.1	
82.02	Install and configure software related to audio programs.	MAFS.912.NQ.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
82.03	Demonstrate basic knowledge of computer system requirements.	MAFS.912.A-REI.1.1	
82.04	Install plug-ins or additional audio source material such as beats and or samples.		
82.05	Diagram the signal flow of a digital audio workstation.	MAFS.912.F-IF.3.7	SC.912.N.1.1
83.0	Operate an audio workstation. – The student will be able to:		
83.01	Demonstrate knowledge of the digital audio workstation interface.	MAFS.912.A-REI.1.1	SC.912.N.1.1
83.02	Create and arrange a multi-track project.	MAFS.912.A-CED.1.1 LAFS.910.W.2.6; LAFS.1112.W.2.6	
83.03	Create interest and effect using editing techniques.	MAFS.912.A-CED.1.1 LAFS.910.W.2.6; LAFS.1112.W.2.6	
83.04	Design and edit audio using a waveform editor.	MAFS.912.A-REI.1.1 LAFS.910.W.2.6; LAFS.1112.W.2.6	
83.05	Record audio directly to the digital audio workstation.	MAFS.912.NQ.1.1 LAFS.910.W.2.6; LAFS.1112.W.2.6	
83.06	Mix audio.	LAFS.910.W.2.6; LAFS.1112.W.2.6	
83.07	Demonstrate skill in using audio effects and plug-ins.	MAFS.912.A-REI.1.1 LAFS.910.W.2.6; LAFS.1112.W.2.6	
83.08	Prepare an audio project for finishing and final mix down.	LAFS.910.W.2.6; LAFS.1112.W.2.6	
83.09	Transfer audio files between various audio software applications.	MAFS.912.F-IF.3.7 LAFS.910.W.2.6; LAFS.1112.W.2.6	
83.10	Demonstrate the understanding of audio file bit depth, bandwidth and dithering and be able to explain when and where these apply in various applications of digital audio production.	MAFS.912.A-REI.1.1	
83.11	Export finished audio.		
84.0	Demonstrate proficiency in using presentation software and equipment. – The student will be able to:		
84.01	Using presentation software, create a multimedia presentation that incorporates shot and edited video, animation, music, narration and adheres to good design principles, use of transitions, and effective message conveyance.	MAFS.912.A-CED.1.1 LAFS.910.L.1.1; LAFS.1112.W.3.8	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
84.02	Demonstrate knowledge of the roles and responsibilities of a multimedia production team (e.g. project manager, creative or design director, content experts, writers, graphic designers, animators, sound designers, videographer, interface designers/programmers).	MAFS.912.A-REI.1.1 LAFS.910.SL.1.1; LAFS.1112.SL.2.4 LAFS.1112.SL.2.5	
84.03	Collaborate with team members to plan, edit, evaluate, and present a multimedia presentation.	MAFS.912.A-REI.1.1 LAFS.910.L.1.1; LAFS.1112.W.3.8	

Florida Department of Education
Student Performance Standards

Course Title: **Computer Networking Fundamentals**
Course Number: **9003480**
Course Credit: **1**

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
85.0	Demonstrate understanding of network technologies. – The student will be able to:		
85.01	Explain the function of common networking protocols such as TCP,FTP, UDP, TCP/IP suite, DHCP, TFTP, DNS, HTTP(S), ARP, SIP (VoIP), RTP (VoIP), SSH, POP3, NTP, IMAP4, TELNET, SMTP, SNMP 2/3, ICMP, IGMP, TLS.		
85.02	Identify commonly used TCP and UDP default ports such as TCP ports, FTP – 20, 21, SSH – 22, TELNET – 23, SMTP – 25, DNS – 53, HTTP – 80, POP3 – 110, NTP – 123, IMAP4 – 143, HTTPS – 443, UDP ports TFTP – 69, DNS – 53, BOOTPS/DHCP – 67, SNMP – 161.		
85.03	Identify the following address formats IPv6, IPv4, and MAC Addressing.		
85.04	Evaluate the proper use of the following addressing technologies and addressing schemes: Subnetting, Classful vs. classless (e.g. CIDR, Supernetting), NAT, PAT, SNAT, Public vs. private, DHCP (static, dynamic APIPA), Addressing schemes, Unicast, Multicast, Broadcast.		
85.05	Identify common IPv4 and IPv6 routing protocols - Link state OSPF, IS-IS, Distance vector, RIP, RIPv2, BGP, Hybrid EIGRP.		
85.06	Explain the purpose and properties of routing such as IGP vs EGP, Static vs dynamic, Next Hop, Understanding routing tables and how they pertain to path selection, and explain convergence (steady state).		
85.07	Compare the characteristics of wireless communication standards such as 802.11 a/b/g/n, speeds, distance, channels, frequency, authentication and encryption such as WPA, WEP, RADIUS, and TKIP.		
86.0	Understand, install, and configure network hardware. – The student will be able to:		
86.01	Categorize standard cable types and their properties such as CAT3, CAT5, CAT5e, CAT6, STP, UTP, Multimode fiber, single-mode fiber, coaxial, serial, plenum vs. non-plenum, transmission speeds, distance, duplex, noise immunity (security, EMI), and		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	frequency.		
86.02	Identify common connector types such as RJ-11, RJ-45, BNC, SC, ST, LC, RS-232.		
86.03	Identify common physical network topologies such as Star, Mesh, Bus, Ring, Point to Point, Point to Multipoint, and Hybrid.		
86.04	Differentiate and implement appropriate wiring standards such as 568A, 568 B Straight vs. cross over, rollover, and Loopback.		
86.05	Categorize Wan technologies types and properties such as Frame Relay, E1/T1, ADSL, SDSL, VDSL, Cable modem, Satellite, E3/T3, Oc-x, Wireless, ATM, SONET, MPLS, ISD Bri, ISDN PRI, POTS, PSTN, Circuit, switch, packet switch, speed, transmission media, and Distance.		
86.06	Categorize LAN technology types and properties such as Ethernet, 10BaseT, 100BaseTX, 100BaseFX, 1000BaseT, 1000BaseX, 10GbaseSR, 10GBaseLR, 10GBaseER, 10GBaseSW, 10GBaseLW, 10GBaseEW, 10GBaseT and properties of each such as CSMA/CD, Broadcast, Collision, Bonding, Speed, and Distance.		
86.07	Explain common logical network topologies and their characteristics such as peer to peer, client/server, VPN, VLAN.		
86.08	Install components of wiring distribution such as Vertical and horizontal cross connects, Patch panels, 66 block, MDFs, IDFs, 25 pair, 100 pair, 110 block, Demarc, Demarc extension, Smart jack, verify wiring installation, and Verify wiring termination.		
87.0	Understand, install and configure networking devices. – The student will be able to:		
87.01	Install, configure and differentiate between common network devices such as hub, repeater, modem, NIC, media converters, basic switch, bridge, wireless access point, basic router, basic firewall, basic DHCP server.		
87.02	Identify the function of specialized network devices such as multilayer switch, Content switch, IDS/IPS, load balancer, multifunction network devices, DNS server Bandwidth shaper, proxy server, and CSU/DSU.		
87.03	Explain the advance features of a switch such as PoE, Spanning tree, VLAN, Trunking, Port mirroring, and Port Authentication.		
87.04	Implement a basic wireless network using the following technologies installed client, access point placement, access point with encryption, access point with configured channels and frequencies, and a set ESSSID and beacon.		
88.0	Understand, install and configure network management software. – The student will be able to:		
88.01	Explain the function of the OSI layer model such as physical, data link, network, transport, session, presentation, and application.		
88.02	Identifies types of configuration management documentation such as wiring schematics, physical and logical network diagram, baselines, policies, procedure and configuration and regulations.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
88.03	Evaluate the network based on configuration management documentation such as compare wiring schematics, physical and logical network diagrams, baselines, policies and procedures, and configurations to network devices and infrastructure, and update wiring schematics, physical and logical network diagrams, configuration and job logs as needed.		
88.04	Conduct network monitoring to identify performance and connectivity issues using the following: network monitoring utilities (packet sniffers, connectivity software, load testing, throughput testers) and system logs, history, event log.		
88.05	Conduct network monitoring to identify performance and connectivity issues using the following: network monitoring utilities (packet sniffers, connectivity software, load testing, and throughput testers), system logs, history logs, and event logs.		
88.06	Explain different methods and rationales for network performance optimization such as QoS, Traffic shaping, Load balancing, high availability, Caching engines, Fault tolerance, Latency sensitivity, High bandwidth applications, VoIP, Video applications, and Uptime.		
88.07	Implement the following network troubleshooting methodology - Information gathering, identify symptoms and problems, Identify the affected areas of the network, Determine if anything has changed, Establish the most probable cause, Determine if escalation is necessary, Create an action plan and solution identifying potential effects, Implement and test the solution, Identify the results and effects of the solution, and Document the solution and the entire process.		
88.08	Troubleshoot common connectivity issues and select an appropriate solution Physical issues: Cross talk, Near End crosstalk, Attenuation, collisions, Shorts Open, Impedance mismatch (echo), and Interference - Logical issues: Port speed, Port duplex mismatch, incorrect VLAN, Incorrect IP address, Wrong gateway, Wrong DNS, Wrong subnet mask, Issues that should be identified but escalated: Switching loop, Routing loop, Route problems, Proxy arp, Broadcast storms, Wireless Issues: Interference (bleed, environmental factors), incorrect encryption, Incorrect channel, Incorrect frequency, ESSID mismatch, Standard mismatch (802.11 a/b/g/n), Distance, Bounce, and Incorrect antenna placement.		
89.0	Understand, install and configure networking tools. – The student will be able to:		
89.01	Select the appropriate command line interface tool and interpret the output to verify functionality such as Traceroute, Ipconfig, IFconfig, Ping, Arp ping, Arp, Nslookup, Hostname, Dig, Mtr, Route, and Nbtstat.		
89.02	Explain the purpose of network scanners such as Packet sniffers, Intrusion detection software, Intrusion prevention software, Port scanners.		
89.03	Utilize the appropriate hardware tools such as Cable testers, Protocol analyzer, Certifiers, TDR, OTDR, Multimeter, Toner probe, Butt set, Punch down tool, Cable stripper, Snips, Voltage event recorder, and Temperature monitor.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
90.0	Install, configure, and manage network security hardware and software devices. – The student will be able to:		
90.01	Explain the function of hardware and software security devices such as Network based firewall, Host based firewall, IDS, IPS, and VPN concentrator.		
90.02	Explain common features of a firewall for example: Application layer vs. network layer, Stateful vs. stateless, Scanning services, Content filtering, Signature identification, and Zones.		
90.03	Explain the methods of network access security using the following: Filtering: ACL, MAC filtering, IP filtering, Tunneling and encryption, SSL VPN, VPN, L2TP, PPTP, IPSEC, Remote access, RAS, RDP, PPPoE, PPP, VNC, and ICA.		
90.04	Explain methods of user authentication using the following methods: PKI, Kerberos, AAA, RADIUS, TACACS+, Network access control, 802.1x, CHAP, MS-CHAP, and EAP.		
90.05	Explain issues that affect device security such as the Physical security, Restricting local and remote access, Secure methods vs. unsecure methods, SSH, HTTPS, SNMPv3, SFTP, SCP, and TELNET, HTTP, FTP, RSH, RCP, SNMPv1/2.		
90.06	Identify common security threats and mitigation techniques such as Security threats, DoS, Viruses, Worms, Attackers, Man in the middle, murf, Rogue access points, Social engineering (phishing), Mitigation techniques, Policies and procedures, User training, Patches and updates.		

Florida Department of Education
Student Performance Standards

Course Title: **Cybersecurity Fundamentals**
Course Number: **9003490**
Course Credit: **1**

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
91.0	Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends. – The student will be able to:		
91.01	Describe the history of cybersecurity, including the evolution of a hacker culture.		SC.912.N.3.2
91.02	Discuss the trends and national initiatives related to cybersecurity.		SC.912.N.2.4
91.03	Distinguish between information assurance and cybersecurity.		
91.04	Describe the concepts of confidentiality as it relates to user and data impact.		SC.912.N.1.4
91.05	Explain authentication and the concept of non-repudiation.		SC.912.N.2.1
91.06	Describe the concept of “Hacking - The Human Element” and elaborate on its implications to cybersecurity.		
92.0	Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:		
92.01	Viruses.		SC.912.L.16.7
92.02	Trojan Horses.		SC.912.L.19.9
92.03	Logic Bombs.		SC.912.L.19.8
92.04	Worms.		SC.912.L.17.6
93.0	Recognize and be able to differentiate and explain the following access control models. – The student will be able to:		
93.01	MAC (Mandatory Access Control).		
93.02	DAC (Discretionary Access Control).		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	93.03 RBAC (Role Based Access Control).		
94.0	Recognize and be able to differentiate and explain the following methods of authentication. – The student will be able to:		
	94.01 Kerberos.		SC.912.L.14.2
	94.02 CHAP (Challenge Handshake Authentication Protocol).		
	94.03 Certificates.		
	94.04 Username / Password.		SC.912.L.16.5
	94.05 Tokens.		
	94.06 Multi-factor.		
	94.07 Mutual.		
	94.08 Biometrics.		SC.912.L.16.11
95.0	Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:		
	95.01 DOS/DDOS (Denial of Service/Distributed Denial of Service).		SC.912.L.14.52
	95.02 Back Door.		
	95.03 Spoofing.		
	95.04 Man in the Middle.		
	95.05 Replay.		
	95.06 TCP/IP Hijacking.		
	95.07 Weak Keys.		
	95.08 Mathematical.		
	95.09 Social Engineering.		
	95.10 Birthday.		
	95.11 Password Guessing (e.g., Brute Force, Dictionary).		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	95.12 Software Exploitation.		
96.0	Recognize and understand the processes and risks associated with the following security concerns and tasks. – The student will be able to:		
	96.01 Identify non-essential services and protocols and know what actions to take to reduce the risks of those services and protocols.		
	96.02 Understand the concept of and know how reduce the risks of social engineering.		
	96.03 Understand the concept and significance of auditing, logging and system scanning.		SC.912.L.14.52
	96.04 Identify and be able to differentiate different cryptographic standards and protocols.		
97.0	Recognize and understand the administration of the following types of remote access technologies. – The student will be able to:		
	97.01 802.1x.		
	97.02 VPN (Virtual Private Network).		
	97.03 RADIUS (Remote Authentication Dial-In User Service).		
	97.04 TACACS (Terminal Access Controller Access Control System).		
	97.05 L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).		
	97.06 SSH (Secure Shell).		
	97.07 IPSEC (Internet Protocol Security).		
	97.08 Vulnerabilities.		
98.0	Recognize and understand the administration of the following email security concepts. – The student will be able to:		
	98.01 S/MIME (Secure Multipurpose Internet Mail Extensions).		
	98.02 PGP (Pretty Good Privacy) like technologies.		
	98.03 Vulnerabilities.		
	98.04 SPAM.		SC.912.L.14.2
	98.05 Hoaxes.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
99.0	Recognize and understand the administration of the following Internet security concepts. – The student will be able to:		
99.01	SSL/TLS (Secure Sockets Layer/Transport Layer Security).		SC.912.L.14.24
99.02	HTTP/S (Hypertext Transfer Protocol/Hypertext Transfer Protocol over Secure Sockets Layer).		
99.03	Instant Messaging (i.e., Vulnerabilities, Packet Sniffing, Privacy).		SC.912.L.14.3
100.0	Recognize and understand the administration of the following vulnerabilities. – The student will be able to:		
100.01	Java Script.		
100.02	ActiveX.		
100.03	Buffer Overflows.		
100.04	Cookies.		
100.05	Signed Applets.		
100.06	CGI (Common Gateway Interface).		
100.07	SMTP (Simple Mail Transfer Protocol) Relay.		
101.0	Recognize and understand the administration of the following directory security concepts. – The student will be able to:		
101.01	SSL/TLS (Secure Sockets Layer/Transport Layer Security).		
101.02	LDAP (Lightweight Directory Access Protocol).		
102.0	Recognize and understand the administration of the following file transfer protocols and concepts. – The student will be able to:		
102.01	S/FTP (File Transfer Protocol).		SC.912.L.16.5
102.02	Blind FTP (File Transfer Protocol)/Anonymous.		SC.912.L.16.5
102.03	File Sharing.		
102.04	Vulnerabilities (i.e., packet sniffing, naming conventions).		
103.0	Recognize and understand the administration of the following wireless technologies and concepts. – The student will be able to:		
103.01	WTLS (Wireless Transport Layer Security).		
103.02	802.11 and 802.11x.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
103.03 WEP/WAP (Wired Equivalent Privacy/Wireless Application Protocol).		
103.04 Vulnerabilities (i.e., site surveys).		
104.0 Compare and contrast the following types of intrusion detection in terms of implementation and configuration. – The student will be able to:		
104.01 Network Based – Active and Passive.		SC.912.L.14.2
104.02 Host Based – Active and Passive.		SC.912.L.14.2
104.03 Honey Pots.		
104.04 Incident Response.		SC.912.L.14.52
105.0 Be able to identify and explain the following different kinds of cryptographic algorithms. – The student will be able to:		
105.01 Hashing.		SC.912.L.16.5
105.02 Symmetric.		
105.03 Asymmetric.		
106.0 Understand how cryptography and digital signatures address the following security concepts. – The student will be able to:		
106.01 Confidentiality.		
106.02 Integrity.		SC.912.L.16.3
106.03 Authentication.		SC.912.L.16.3
106.04 Non-Repudiation.		
106.05 Access Control.		SC.912.L.14.2
107.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure). – The student will be able to:		
107.01 Certificates (e.g., policies, practice statements).		
107.02 Revocation.		
107.03 Trust Models.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
108.0 Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles. – The student will be able to:		
108.01 Centralized versus Decentralized.		
108.02 Hardware versus software key storage.		
108.03 Private key storage.		
108.04 Escrow.		
108.05 Expiration.		
108.06 Revocation versus suspension (e.g., status checking).		
108.07 Recovery authorization schema (e.g., M-of-N Control - Of M appropriate individuals, N must be present to authorize recovery).		
108.08 Renewal.		
108.09 Destruction.		
108.10 Key Usage.		
108.11 Multiple Key Pairs (Single, Dual).		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Digital Media Technology**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9005100
CIP Number	0509070200
Grade Level	9-12, 30, 31
Standard Length	5 credits
Teacher Certification	BUS ED 1 @2 DIGI MEDIA 7G INFO TECH 7G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in technical digital media positions in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills.

The content includes but is not limited to practical experiences in the implementation, management, and maintenance of advanced telecommunication environments associated with the creation, packaging, and delivery of digital media.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points in the program.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	**Graduation Requirement**
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	9005110	Digital Media Fundamentals	1 credit	15-1142	3	VO
	9005120	Digital Media Production Systems	1 credit		3	VO
	9005130	Digital Media Delivery Systems	1 credit		3	VO
	9005140	Advanced Digital Media Systems	1 credit		3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9005110	2/87 2%	3/80 4%	1/83 1%	4/69 6%	3/67 4%	3/70 4%	2/69 3%	2/82 2%	2/66 3%	3/74 4%	5/72 7%
9005120	22/87 25%	25/80 31%	3/83 4%	22/69 32%	4/67 6%	21/70 30%	22/69 32%	4/82 5%	18/66 27%	4/74 5%	25/72 35%
9005130	20/87 23%	20/80 25%	1/83 1%	20/69 29%	2/67 3%	19/70 27%	20/69 29%	1/82 1%	15/66 23%	1/74 1%	20/72 28%
9005140	#	#	#	#	#	#	#	#	#	#	#

** *Alignment pending review*

Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
9005110	17/67 25%	10/75 13%	16/54 30%	3/46 7%	3/45 7%	3/45 7%	3/45 7%
9005120	10/67 15%	15/75 20%	8/54 15%	3/46 7%	3/45 7%	2/45 4%	2/45 4%
9005130	10/67 15%	15/75 20%	9/54 17%	3/46 7%	3/45 7%	2/45 4%	2/45 4%
9005140	1/67 1%	1/75 1%	1/54 2%	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Digital Media Technology.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Digital Media Technology.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Digital Media Technology.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Describe characteristics of digital media relative to format, standards, encoding schemes, and origin.
19.0 Compare and contrast various forms of digital media delivery systems.
20.0 Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital video.
21.0 Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital audio.
22.0 Explain the role of animation in digital media and the ways in which it is created and deployed.
23.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Digital Media Technology.
24.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Digital Media Technology.
25.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Digital Media Technology.
26.0 Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital video.

27.0 Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital audio.
28.0 Apply industry standard workflow management methods applicable to the integration and synchronization of audio and video into a single digital media product.
29.0 Apply industry standard asset management methods applicable to development of a digital media product.
30.0 Explain the importance of calibration in the production of digital media and the means by which it is accomplished.
31.0 Demonstrate proficiency in producing a digital media product for delivery using Digital Video Disc (DVD) media.
32.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based on-demand system (e.g., VOD, IPTV).
33.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based streaming system.
34.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based system featuring multi-point presence.
35.0 Demonstrate proficiency in producing a digital media product for delivery using mobile communication devices.
36.0 Demonstrate proficiency in producing a digital media product for delivery using satellite delivery systems.
37.0 Describe the evolution, role, and characteristics of a Content Distribution Network (CDN) for delivering digital media to Internet points.
38.0 Demonstrate an understanding of the uses, technologies, standards, and protocols associated with digital signage.
39.0 Demonstrate an understanding of Internet Protocol Television (IPTV) systems, their types, applications, and implementation issues.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Digital Media Fundamentals**
Course Number: **9005110**
Course Credit: **1**

Course Description:

This course introduces students to the essential concepts, components, terminology, and knowledge about digital media, software applications, and delivery systems.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Digital Media Technology.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question	

Florida Standards			Correlation to CTE Program Standard #
		the author seeks to address. LAFS.910.RST.2.6	
	01.03	Integration of Knowledge and Ideas	
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
	01.04	Range of Reading and Level of Text Complexity	
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0		Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Digital Media Technology.	
	02.01	Text Types and Purposes	
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.02	Production and Distribution of Writing	
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Digital Media Technology.		
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
18.0	Describe characteristics of digital media relative to format, standards, encoding schemes, and origin. – The student will be able to:		
18.01	Determine the meaning of symbols, key terms, and other domain-specific words and phrases.	MAFS.912.N-Q.1.1 LAFS.910.L.3.6; LAFS.1112.L.3.6	
18.02	Identify and differentiate the appropriate use of digital media formats based on standard industry practices.	MAFS.912.N-Q.1.1	
18.03	Identify and differentiate the appropriate use of encoding schemes based on project needs.	MAFS.912.N-Q.1.1	
18.04	Identify the difference between digital media source files and digital media delivery systems.	MAFS.912.N-Q.1.1	
19.0	Compare and contrast various forms of digital media delivery systems. – The student will be able to:		
19.01	Identify the differences between fixed digital media formats and digital media streaming.	MAFS.912.N-Q.1.1; MAFS.912.F-IF.2.4	
19.02	Identify the various forms of digital media content distribution.	MAFS.912.N-Q.1.1; MAFS.912.F-IF.2.4	
19.03	Describe the development of digital media technology as it pertains to digital signage.	MAFS.912.A-REI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
19.04	Describe the impact of mobile and Wi-Fi technologies on the digital media development industry.	MAFS.912.A-REI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	SC.912.L.17.15
20.0	Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital video. – The student will be able to:		
20.01	Identify digital image file types and their appropriate uses.	MAFS.912.N-Q.1.1; MAFS.912.F-IF.2.4	
20.02	Compare and contrast the similarities and differences between analog and digital recording.	MAFS.912.G-SRT1.2	SC.912.P.10.1; SC.912.P.10.13; SC.912.P.10.16; SC.912.P.10.17;

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
			SC.912.P.10.18
	20.03 Describe the characteristics of digital video.	MAFS.912.A-REI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
	20.04 Identify and describe the various application platforms used in digital video development.	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1; LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
21.0	Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital audio. – The student will be able to:		
	21.01 Identify and describe the fundamental aspects of sound theory.	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1; LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	SC.912.P.10.1; SC.912.P.10.13; SC.912.P.10.16; SC.912.P.10.17; SC.912.P.10.18
	21.02 Compare and contrast the similarities and differences between analog and digital recording.	MAFS.912.G-SRT.1.2	SC.912.P.10.1; SC.912.P.10.13; SC.912.P.10.16; SC.912.P.10.17; SC.912.P.10.18
	21.03 Describe the characteristics of digital audio.	MAFS.912.AREI.1.1; LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
	21.04 Identify and describe the various application platforms used in digital audio recording and editing.	MAFS.912.NQ.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
22.0	Explain the role of animation in digital media and the ways in which it is created and deployed. – The student will be able to:		
	22.01 Describe the process of developing animations and identify the industry standard platforms used in their creation.	MAFS.912.AREI.1.1; LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
	22.02 Describe the similarities and differences as well as industry standard platforms used in the development of 2D and 3D graphics.	MAFS.912.REI.1.1; MAFS.912.G-SRT.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
22.03 Identify and describe the challenges in developing and deploying digital media content.	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1; LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
22.04 Identify the components and characteristics of motion that make up an animation.	MAFS.912.NQ.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Digital Media Production Systems**
Course Number: **9005120**
Course Credit: **1**

Course Description:

This course introduces students to the digital video and audio authoring environments, equipment, and software applications. Content includes management aspects of creating, saving, and distributing digital assets.

Florida Standards			Correlation to CTE Program Standard #
23.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Digital Media Technology.		
	23.01 Key Ideas and Details		
	23.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	23.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	23.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	23.02 Craft and Structure		
	23.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	23.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	23.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
23.03	Integration of Knowledge and Ideas		
	23.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	23.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	23.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
23.04	Range of Reading and Level of Text Complexity		
	23.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	23.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
24.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Digital Media Technology.		
24.01	Text Types and Purposes		
	24.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	24.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
24.02	Production and Distribution of Writing		
	24.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	24.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	24.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	24.03	Research to Build and Present Knowledge	
	24.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	24.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	24.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	24.04	Range of Writing	
	24.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
25.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Digital Media Technology.	
	25.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	25.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	25.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	25.04	Model with mathematics. MAFS.K12.MP.4.1	
	25.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	25.06	Attend to precision. MAFS.K12.MP.6.1	
	25.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
25.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
26.0	Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital video. – The student will be able to:		
26.01	Produce video files according to industry standard specifications using digital media development hardware and software applications.	MAFS.912.SMD.1.4 LAFS.910.W.2.6; LAFS.1112.W.2.6	
26.02	Identify and incorporate the appropriate use of digital video encoding based on industry standard practices.	MAFS.912.NQ.1.1	
26.03	Identify the various tools and procedures utilized in the conversion of digital media file types.	MAFS.912.NQ.1.1	
26.04	Demonstrate proficiency in the utilization of standard video production equipment.	MAFS.912.NQ.1.1	SC.912.P.10.20; SC.912.P.10.22
26.05	Demonstrate proficiency in the connectivity and configuration of digital video equipment.	MAFS.912.A-REI.1.1	
26.06	Identify and troubleshoot lighting issues as they pertain to the recording of digital video as well as describe common industry practices in the staging of light sources.	MAFS.912.NQ.1.1	
27.0	Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital audio. – The student will be able to:		
27.01	Produce audio files according to industry standard specifications using digital media development hardware and software applications.	MAFS.912.SMD.1.3; MAFS.912.SMD.1.4 LAFS.910.W.2.6; LAFS.1112.W.2.6	
27.02	Demonstrate proficiency in the utilization of standard audio production equipment.	MAFS.912.A-REI.1.1	SC.912.P.10.21
27.03	Demonstrate proficiency in the connectivity and configuration of digital audio equipment.	MAFS.912.A-REI.1.1	
28.0	Apply industry standard workflow management methods applicable to the integration and synchronization of audio and video into a single digital media product. – The student will be able to:		
28.01	Describe the various media integration systems and their appropriate uses in the development of digital media.	MAFS.912.A-REI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
28.02	Identify and describe the importance of version control in digital asset management.	MAFS.912.A-REI.1.1, MAFS.912.NQ.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
	28.03 Identify and describe the various forms of digital audio / video synchronization and the tools and techniques used to sync digital audio and video.	MAFS.912.A-REI.1.1; MAFS.912.NQ.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
29.0	Apply industry standard asset management methods applicable to development of a digital media product. – The student will be able to:		
	29.01 Identify and describe the standard practices for storing and archiving digital media assets.		
	29.02 Identify and describe the standard practices for retrieving digital media assets both on local and remote work stations / networks.		
	29.03 Describe the standard practices for establishing digital asset security.		
	29.04 Describe the purpose and function of metadata as it pertains to the management of digital assets.		
30.0	Explain the importance of calibration in the production of digital media and the means by which it is accomplished. – The student will be able to:		
	30.01 Identify the necessity and effects of calibration on various digital media systems.	MAFS.912.NQ.1.1	SC.912.N.1.1
	30.02 Identify standard practices in calibrating digital media production equipment.	MAFS.912.NQ.1.1	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Digital Media Delivery Systems**
Course Number: **9005130**
Course Credit: **1**

Course Description:

This course introduces students to the digital video and audio delivery media and associated protocols. Content includes technical aspects of evolving and emerging technologies used in the delivery of digital content.

Florida Standards			Correlation to CTE Program Standard #
23.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Digital Media Technology.		
	23.01 Key Ideas and Details		
	23.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	23.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	23.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	23.02 Craft and Structure		
	23.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	23.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	23.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
23.03	Integration of Knowledge and Ideas		
	23.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	23.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	23.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
23.04	Range of Reading and Level of Text Complexity		
	23.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	23.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
24.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Digital Media Technology.		
24.01	Text Types and Purposes		
	24.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	24.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
24.02	Production and Distribution of Writing		
	24.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	24.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	24.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	24.03	Research to Build and Present Knowledge	
	24.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	24.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	24.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	24.04	Range of Writing	
	24.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
25.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Digital Media Technology.	
	25.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	25.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	25.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	25.04	Model with mathematics. MAFS.K12.MP.4.1	
	25.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	25.06	Attend to precision. MAFS.K12.MP.6.1	
	25.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
25.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
31.0 Demonstrate proficiency in producing a digital media product for delivery using Digital Video Disc (DVD) media. – The student will be able to:		
31.01 Identify and describe the various physical and application formats for (DVD) media technology.	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
31.02 Identify and describe the various (DVD) physical outputs for media players.	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
31.03 Identify the features and specifications of (DVD) media and the (DVD) format.	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1	SC.912.P.10.16
31.04 Identify and describe the (DVD) media industry specification (red book standard).	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
31.05 Identify and describe the various coding mechanisms utilized in the creation of (DVD) media.	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
31.06 Identify and describe standard copy protection practices in (DVD) media creation.	MAFS.912.NQ.1.1; MAFS.912.AREI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
31.07 Use standard (DVD) authoring / editing systems in the creation of (DVD) media.	MAFS.912.AREI.1.1	
31.08 Identify and describe the appropriate use of standard television formats (PAL & NTSC).	LAFS.910.SL.1.1; LAFS.910.L.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.SL.1.1	
	31.09 Demonstrate an awareness of the issues in quality when compressing digital media.	MAFS.912.AREI.1.1	
32.0	Demonstrate proficiency in producing a digital media product for delivery using an Internet-based on-demand system (e.g., VOD, IPTV). – The student will be able to:		
	32.01 Develop digital media in the appropriate specified format for delivery on On-Demand Systems.	MAFS.912.MO.1.3; MAFS.912.MO.1.4	
	32.02 Develop digital media in the appropriate specified format for delivery on Video on demand (VOD) Systems.	MAFS.912.MO.1.3; MAFS.912.MO.1.4	
	32.03 Develop digital media in the appropriate specified format for delivery on IP Television (IPTV).	MAFS.912.MO.1.3; MAFS.912.MO.1.4	
33.0	Demonstrate proficiency in producing a digital media product for delivery using an Internet-based streaming system. – The student will be able to:		
	33.01 Develop digital media in the appropriate specified format for delivery on On-Demand Systems.	MAFS.912.MO.1.3; MAFS.912.MO.1.4	
	33.02 Develop digital media in the appropriate specified format for delivery on Video on demand (VOD) Systems.	MAFS.912.MO.1.3; MAFS.912.MO.1.4	
	33.03 Develop digital media in the appropriate specified format for delivery on IP Television (IPTV).	MAFS.912.MO.1.3; MAFS.912.MO.1.4	
	33.04 Develop digital media in the appropriate specified format for delivery on Grid Casting systems.	MAFS.912.MO.1.3; MAFS.912.MO.1.4	
34.0	Demonstrate proficiency in producing a digital media product for delivery using an Internet-based system featuring multi-point presence. – The student will be able to:		
	34.01 Demonstrate an awareness of the tools and practices used in establishing multiple points of presence.		
	34.02 Demonstrate an awareness of design constraints and attributes as they pertain to producing digital media for delivery on internet-based systems.		
	34.03 Demonstrate an awareness of communication channels and considerations as they pertain to producing digital media for delivery on internet-based systems.		
35.0	Demonstrate proficiency in producing a digital media product for delivery using mobile communication devices. – The student will be able to:		
	35.01 Develop digital media in the appropriate specified format for delivery on smart phones.	LAFS.910.W.2.6; LAFS.1112.W.2.6	
	35.02 Develop digital media in the appropriate specified format for delivery on tablet PC.	LAFS.910.W.2.6; LAFS.1112.W.2.6	
	35.03 Develop digital media in the appropriate specified format for delivery on laptops.	LAFS.910.W.2.6; LAFS.1112.W.2.6	
	35.04 Demonstrate an awareness of Bluetooth considerations as they pertain to the production of digital media for delivery on mobile communication devices.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
35.05	Demonstrate an awareness of security / privacy issues as they pertain to the production of digital media for delivery on mobile communication devices.		
35.06	Demonstrate an awareness of Personalization (e.g., digital identities, authentication) as it pertains to mobile security.		
35.07	Demonstrate an awareness of data portability issues as they pertain to the production of digital media for delivery on mobile communication devices.		
35.08	Demonstrate an awareness of Social Application Programming Interfaces (e.g., OpenSocial).		
36.0	Demonstrate proficiency in producing a digital media product for delivery using satellite delivery systems. – The student will be able to:		
36.01	Identify industry applications utilized in producing a digital media product for delivery using satellite delivery systems.		
36.02	Identify current technologies and capabilities used in the production of a digital media product for delivery using satellite delivery systems.		
36.03	Describe the current limitations (e.g. latency) of delivering digital media via satalite delivery systems.	LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
36.04	Identify and describe common issues in delivering digital media via simulcast systems.		
36.05	Identify and describe the process of delivering digital media via mulitcast systems.		
37.0	Describe the evolution, role, and characteristics of a Content Distribution Network (CDN) for delivering digital media to Internet points. – The student will be able to:		
37.01	Describe content networking techniques as they pertain to the delivering of digital media to internet points.	MAFS.AREI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
37.02	Describe common practices and protocols (e.g., ICAP, OPES) in digital media development.	MAFS.AREI.1.1; MAFS.MG.1.1; MAFS.NQ.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
37.03	Describe common practices in digital media development as they pertain to the synchronization and loading of digital content across a content distribution network (CDN).	MAFS.AREI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	
37.04	Describe common practices in establishing asset security with respect to delivering digital media to content distribution networks (CDN).	MAFS.AREI.1.1 LAFS.910.SL.1.1; LAFS.910.L.1.1 LAFS.1112.SL.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Advanced Digital Media Systems**
Course Number: **9005140**
Course Credit: **1**

Course Description:

This course covers advanced technologies and environments typical in robust digital media applications, including live and pre-recorded scenarios.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks			FS-M/LA	NGSSS-Sci
38.0	Demonstrate an understanding of the uses, technologies, standards, and protocols associated with digital signage. – The student will be able to:			
38.01	Demonstrate an understanding of digital signage uses and applications.		MAFS.912.AREI.1.1	
38.02	Demonstrate an understanding of digital signage standards (e.g., SMIL).		MAFS.912.AREI.1.1	
38.03	Demonstrate an understanding of common protocols (e.g., SMS, Bluetooth) used in the distribution of digital media to digital signage.		MAFS.912.AREI.1.1	
38.04	Demonstrate an understanding of display media technology.		MAFS.912.AREI.1.1	
38.04.1	Demonstrate an understanding of the technology associated with conventional displays (LCD, LED, Plasma).		MAFS.912.AREI.1.1	
38.04.2	Demonstrate an understanding of the technology associated with holographic displays.		MAFS.912.AREI.1.1	
38.04.3	Demonstrate an understanding of the technology associated with 3D Displays.		MAFS.912.AREI.1.1	
38.04.4	Demonstrate an understanding of the technology associated with large-scale displays.		MAFS.912.AREI.1.1	
38.05	Demonstrate an understanding of content playback and management as it pertains to the use of digital media via digital signage.		MAFS.912.AREI.1.1	
38.06	Demonstrate an understanding of Network Infrastructure.		MAFS.912.AREI.1.1	
38.06.1	Demonstrate an understanding of Ethernet network protocols.		MAFS.912.AREI.1.1	

CTE Standards and Benchmarks			FS-M/LA	NGSSS-Sci
	38.06.2	Demonstrate an understanding of Wireless (e.g., Wi-Fi, Bluetooth) network protocols.	MAFS.912.AREI.1.1	
38.07	Demonstrate an understanding of digital signage multi-unit synchronization.		MAFS.912.AREI.1.1	
39.0	Demonstrate an understanding of Internet Protocol Television (IPTV) systems, their types, applications, and implementation issues. – The student will be able to:			
39.01	Demonstrate an understanding of converged services and their application to Internet Protocol Television (IPTV).		MAFS.912.AREI.1.1	
39.02	Compare and contrast live versus stored media systems.		MAFS.912.SRT.1.2	
39.03	Demonstrate an understanding of Internet Protocol Television (IPTV) applications and delivery systems.		MAFS.912.AREI.1.1	
39.04	Demonstrate an understanding of common issues that pertain to the development of digital media for distribution over Internet Protocol Television (IPTV) systems.		MAFS.912.AREI.1.1	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Modeling and Simulation**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9005200
CIP Number	0511080401
Grade Level	9-12, 30, 31
Standard Length	5 credits
Teacher Certification	COMPU SCI 6 TEC ED 1 @2 ENG 7G ENG TECH 7G INFO TECH 7G COMP PROG 7G ROBOTICS 7G BUS ED 1 @2
CTSO	FBLA BPA TSA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other 15-1132 – Software Developers, Applications 15-1131– Computer Programmer
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The Modeling and Simulation program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster and the expansive employment opportunities in the field of Modeling and Simulation. This course provides technical skill proficiency and includes competency-based applied learning through the use of hands-on labs and the development of a multi-year portfolio. Students will build academic knowledge, enhance higher-order reasoning and problem-solving skills, develop leadership and collaboration abilities and refine general employability and occupation-specific skills.

The content includes but is not limited to practical experiences in modeling and simulation conceptualization, design, storyboarding, development methodologies, essential programming techniques, prototype development, production processes and implementation challenges. Science, Computer Programming, Math, 2D and 3D Art are embedded throughout the program to emphasize the relationship between these areas and the field of Modeling and Simulation. To further enrich this course sequence it is recommended students take a sequence of electives in either visual arts, computer arts, or digital arts including but not limited to Computer Programming, Web Design, 2D and 3D Art, Gaming and Animation, Robotics and/or Geospatial/Geographic Information Systems Technology.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three to four occupational completion points. Students enrolling in this program must be computer literate. This literacy can be achieved by completing Digital Information Technology (8207310). It is also recommended that students complete academic courses in visual arts, computer arts, or digital arts. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or exit as an occupational completer.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8207310	Digital Information Technology **Or**	1 credit	15-1199	2	PA
	9005210	Modeling and Simulation Foundations	1 credit	15-1199	2	VO
B	9005220	Modeling and Simulation Design	1 credit	15-1199	2	VO
C	9005230	Modeling and Simulation Applications	1 credit	15-1131	3	VO
D	9005240	Modeling and Simulation Prototyping and Innovation	1 credit	15-1131	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9005210	#	5/80 6%	9/83 11%	3/69 4%	4/67 6%	19/70 27%	2/69 3%	9/82 11%	17/66 26%	4/74 35%	3/72 4%
9005220	#	#	#	#	#	#	#	#	#	#	#
9005230	20/87 23%	25/80 31%	1/83 1%	22/69 32%	4/67 6%	22/70 31%	21/69 30%	3/82 4%	18/66 27%	5/74 7%	26/72 36%
9005240	19/87 22%	19/80 24%	#	19/69 28%	#	19/70 27%	19/69 28%	#	14/66 21%	#	20/72 28%

*** Alignment pending review* *# Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	18/54 33%	40/46 87%	40/45 89%	40/45 89%	40/45 89%
9005210	14/67 21%	8/75 11%	14/54 26%	9/46 20%	9/45 20%	#	#
9005220	15/67 22%	9/75 12%	15/54 28%	11/46 24%	11/45 24%	#	#
9005230	13/67 19%	23/75 31%	11/54 20%	1/46 2%	1/45 2%	6/45 13%	6/45 13%
9005240	12/67 18%	17/75 23%	11/54 20%	#	#	10/45 22%	10/45 22%

*** Alignment pending review* *# Alignment attempted, but no correlation to academic course*

Program Recommendations

The Modeling and Simulation program lends itself to integration of the core academic subjects of language arts, math, science, visual arts, and social studies into project activities. It is through a balanced and integrated curriculum that students attain the attitudes, skills, and knowledge needed to compete successfully in today's work force. Implementation models that encourage curriculum integration provide a strong foundation for cross content curricular instruction. Ideally, Modeling and Simulation teachers and cooperating teachers would be provided with collaborative planning time and would work jointly to achieve the goals of the program.

This program emphasizes the development of technical abilities as well as ethical and societal awareness necessary to function in a highly technological society. The use of cooperative learning groups is recommended. By learning and practicing group process skills, students will be prepared to work collaboratively in real work situations. Program graduates will develop enhanced self-esteem as well as the problem solving and teamwork skills necessary to succeed in careers and postsecondary education.

The Modeling and Simulation program places a strong emphasis on workplace learning. Job shadowing and mentoring experiences with Modeling and Simulation professionals along with on-site trips to local businesses connect classroom learning to the workplace. In-class guest speakers bring the real world into the classroom.

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.
This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Modeling and Simulation.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Modeling and Simulation.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Modeling and Simulation.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Demonstrate an understanding of essential modeling and simulation terms by using them as they relate to specific careers requiring modeling and simulation skills and knowledge.
19.0 Demonstrate information fluency using emerging research techniques and technology.
20.0 Demonstrate a knowledge of the information technology industry, the history of computers including their components and functionality, as they relate to Modeling and Simulation.
21.0 Explain intelligent systems as they relate to modeling, simulation and data analysis.
22.0 Develop an understanding of programming languages as they relate to modeling and simulation.
23.0 Demonstrate knowledge of different operating systems.
24.0 Explore software evolution and lifecycle as it relates to modeling and simulation.
25.0 Demonstrate an understanding of visual modeling in relation to the production process.
26.0 Understand the role of texture artists in relation to the production process.
27.0 Demonstrate knowledge of basic materials and textures.
28.0 Demonstrate knowledge of basic lighting.
29.0 Explain visual simulation.
30.0 Explain distributed simulation.

31.0 Explain environmental models.
32.0 Use visual modeling techniques and software to create an environmental model.
33.0 Understand the production process of modeling, simulation and entertainment.
34.0 Demonstrate knowledge of basic animation.
35.0 Demonstrate knowledge of basic 3D rendering.
36.0 Demonstrate basic understanding of modeling principles.
37.0 Analyze model fidelity as related to modeling and simulation techniques.
38.0 Explain object models.
39.0 Demonstrate an understanding of mathematical modeling in relation to the production process.
40.0 Explain agent-based simulation.
41.0 Demonstrate knowledge of photo editing software.
42.0 Demonstrate knowledge of video editing software.
43.0 Incorporate audio assets into a modeling and simulation engine.
44.0 Utilize basic audio production techniques, sound construction, and editing techniques as related to modeling and simulation.
45.0 Apply industry standards for 3D animation software and user interface to create 3D basic and complex models.
46.0 Demonstrate knowledge of rigging.
47.0 Demonstrate knowledge of basic character setup.
48.0 Demonstrate knowledge of motion capture systems.
49.0 Use the production process and relevant modeling and simulation techniques and software to design simple 3D simulation.
50.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Modeling and Simulation.
51.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Modeling and Simulation.
52.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Modeling and Simulation.
53.0 Demonstrate proficiency using various software applications while understanding the hardware requirements needed for modeling and simulations including processors, input/output (I/O) devices.
54.0 Build a simple scenario for experimentation or training.
55.0 Demonstrate an understanding of underlying principles of experimental simulation and how it relates to modeling and simulation.
56.0 Demonstrate an understanding of 3D modeling and simulation software engines.
57.0 Understand systems engineering for simulators.
58.0 Use real time technology to model and simulate environments.
59.0 Demonstrate an understanding of underlying principles of numerical analysis and how it relates to modeling and simulation.
60.0 Analyze numerical characteristics of univariate data sets to describe patterns and departure from patterns, using statistics for various distributions.
61.0 Use probabilities (relative frequency and theoretical), to plan and conduct an experiment that will address control, randomization and measurement of experimental error.
62.0 Use programming to develop modeling and simulation applications.
63.0 Test programs related to modeling and simulation.
64.0 Perform program maintenance to troubleshoot and optimize code.
65.0 Plan program design using object oriented programming (OOP) for modeling and simulation.
66.0 Demonstrate knowledge of non-uniform rational b-splines (NURBS) modeling.

67.0 Demonstrate knowledge of polygon modeling.
68.0 Demonstrate knowledge of animation principles as it relates to the underlying physics of modeling.
69.0 Use the production process and relevant modeling and simulation techniques and software to render a complex 3D simulation.
70.0 Explain and utilize project management and logistics to create and develop 3D modeling and simulation products.
71.0 Understand the implications of intellectual property rights, copyright laws and plagiarism on creative assets.
72.0 Apply the principles of entrepreneurism to Modeling and Simulation and demonstrate an understanding of the design and production of prototypes from conception to mass production.
73.0 Use innovative technologies to create prototypes of models.
74.0 Create and design vector or bitmap art reference to develop a 3D modeling texture map to build a model for simulation.
75.0 Demonstrate the use of experimental and engineering design techniques to produce real world or industry simulations.
76.0 Demonstrate an understanding of underlying principles of discreet event simulation and how it relates to modeling and simulation.
77.0 Implement multimedia programming as it relates to modeling and simulation using a gaming engine.
78.0 Use innovative technologies to create prototypes of models.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Modeling and Simulation Foundations**
Course Number: **9005210**
Course Credit: **1**

Course Description:

This course provides an overview of the development and expansion of the field of Modeling and Simulation and its impact on society and industry. Strategies, processes and methods for conceptualizing modeling and simulation are introduced to serve as a foundation to cultivate interest and introduce technology skills and knowledge necessary for careers in modeling and simulation.

Hands-on activities using an entry-level modeling and simulation development tool (i.e. Auto Desk, Solid Works or other comparable software) should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation of a visual model to aide in the development of a professional portfolio.**

Florida Standards				Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Modeling and Simulation.			
	01.01	Key Ideas and Details		
		01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
		01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
		01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02	Craft and Structure		
		01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
		01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction	

Florida Standards			Correlation to CTE Program Standard #
		force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text supports the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Modeling and Simulation.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing,	

Florida Standards			Correlation to CTE Program Standard #
		rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Modeling and Simulation.		
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	

Florida Standards	Correlation to CTE Program Standard #
03.06 Attend to precision. MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
MA/LA-FS = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
18.0 Demonstrate an understanding of essential modeling and simulation terms by using them as they relate to specific careers requiring modeling and simulation skills and knowledge. – The student will be able to:	LAFS.910.L.3.4, LAFS.910.L.3.6,	
18.01 Define and explain essential modeling and simulation terms and concepts.		
18.02 Identify disciplines which use modeling and simulation tools and discuss their real world applications.		
18.03 Identify modeling and simulation related careers and the educational and professional requirements for various fields.		
18.04 Compare and contrast the central modeling and simulation concepts and careers.		
18.05 Explain the past, present, and future importance of modeling and simulation.		
19.0 Demonstrate information fluency using emerging research techniques and technology. – The student will be able to:	LAFS.910.W.3.7, LAFS.910.W.3.8, LAFS.910.W.3.9, LAFS.910.W.4.10, LAFS.910.L.2.3	
19.01 Compare and contrast emerging technologies and describe how they impact business in the global marketplace (e.g., wireless, wireless web, cell phones, portables/handhelds, smart appliances, home networks, peer-to-peer.).		
19.02 Analyze internet safety issues and practice procedures for complying with acceptable use standards.		
19.03 Use technology tools to collaborate and generate a deliverable product.		
19.04 Develop and display an electronic portfolio.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
19.05	Demonstrate research skills using browsers, search engines, directories, and databases.		
19.06	Create and evaluate a list of materials found online for relevance, appropriateness and bias.		
19.07	Create and communicate a multimedia presentation, including text, sound, and graphics as related to modeling and simulation concepts.		
19.08	Demonstrate proficiency using search engines (e.g., Yahoo!, Google, Northern Light, Lycos, Excite, Bing.).		
19.09	Identify effective Boolean search strategies.		
19.10	Correlate the use of social media in the field of modeling and simulation for a variety of purposes.		
19.11	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, pdf).		
20.0	Demonstrate a knowledge of the information technology industry, the history of computers including their components and functionality, as they relate to Modeling and Simulation. – The student will be able to:	LAFS.910.RI.1.1, LAFS.910.RI.1.2	SC.912.N.4, SC.912.N.4.1
20.01	Explain how information technology and modeling and simulation impact the operation and management of business and society.		
20.02	Explain the emergence of e-commerce and e-government and the potential impact on business and society.		
20.03	Trace the evolution of the Internet from its inception to the present and into the future.		
20.04	Analyze physical models and organize them conceptually based on their development and historical relevance.		
20.05	Use graphic technology to create a visualization of a historic simulator or synthetic environment that has evolved over time.		
20.06	Describe the evolution of the digital computer as it relates to modeling and simulation.		
20.07	Explain the need for and use of input devices and displays to design and create models and simulations.		
20.08	Demonstrate an understanding of storage management (e.g., hard drive, floppy disk) as it relates to creating and storing digital models and simulations.		
20.09	Identify the advantages and limitations of computer-generated models and simulation.		
21.0	Explain intelligent systems as they relate to modeling, simulation and data analysis. – The student will be able to:		
21.01	Define intelligent system.		
21.02	Explain and examine structured logic and semantics.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	21.03 Explain the use of intelligent systems.		
	21.04 Examine programs using the elements of an intelligent system.		
22.0	Develop an understanding of programming languages as they relate to modeling and simulation. – The student will be able to:		
	22.01 Explain the history of programming languages.		
	22.02 Explain how compilers work.		
	22.03 Identify the three types of programming design approaches (e.g., top-down, structured and object-oriented).		
23.0	Demonstrate knowledge of different operating systems. – The student will be able to:		
	23.01 Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).		
	23.02 Discuss the impact of RAM and ROM technology on the development of the modern computer operating systems and microcomputers.		
	23.03 Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).		
	23.04 Identify the internal components of a computer (e.g., power supply, hard drive, mother board, input/output (I/O) cards/ports, cabling).		
	23.05 Identify the different control systems for simulations.		
	23.06 Explain the factors that can limit the simulation capabilities of personal computers.		
24.0	Explore software evolution and lifecycle as it relates to modeling and simulation. – The student will be able to:		
	24.01 Explain software and hardware lifecycles and their steps.		
	24.02 Demonstrate an understanding of the basic concepts of computer maintenance, upgrades and life cycles.		SC. 912.N.3.5
25.0	Demonstrate an understanding of visual modeling in relation to the production process. – The student will be able to:		
	25.01 Explain visual modeling as a process.		
	25.02 Explain the role of a modeler in visual modeling.		
	25.03 Identify job titles associated with visual modeling.		
	25.04 Explain the modeling production pipeline as it relates to visual modeling.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
26.0	Understand the role of texture artists in relation to the production process. – The student will be able to:		
26.01	Define texturing as a process.		
26.02	Define the role of texture artist.		
26.03	Identify job titles associated with texture artist.		
26.04	Identify texture creation in the production pipeline.		
26.05	Demonstrate knowledge of the difference between textures and shades.		
27.0	Demonstrate knowledge of basic materials and textures. – The student will be able to:		
27.01	Demonstrate an understanding of material and texture storage.		
27.02	Apply textures to an object.		
27.03	Demonstrate an understanding of procedural shaders.		
27.04	Demonstrate an understanding of channels.		
27.05	Adjust the transparency, luminance, and reflection of a material.		
27.06	Demonstrate an understanding of displacement maps.		
27.07	Demonstrate an understanding of bump maps.		
27.08	Demonstrate knowledge of material projections.		
27.09	Demonstrate an understanding of UV mapping.		
27.10	Demonstrate an understanding of 3D painting.		
27.11	Understand how light affects the look of materials.		
27.12	Understand how camera angles can affect the look of materials.		
28.0	Demonstrate knowledge of basic lighting. – The student will be able to:		
28.01	Compare and contrast real lighting with 3D lighting.		
28.02	Demonstrate an understanding of 3 point lighting (key, fill, back).		
28.03	Demonstrate an understanding of low-key and high-key lighting.		

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
28.04 Use include/exclude commands to target light on objects.		
28.05 Demonstrate use of negative intensity.		SC.912.P.10.19
29.0 Explain visual simulation. – The student will be able to:		
29.01 Define and explain uses of visual simulation.		
29.02 Explain the use of visual simulation in distributed simulation.		
29.03 Explain the functions of the image generators, display and databases to support visual subsystem of simulators.		
30.0 Explain distributed simulation. – The student will be able to:		
30.01 Explain networking concepts.		
30.02 Explain distributed simulation protocols.		
30.03 Explain the major components in a networked simulation or model.		
31.0 Explain environmental models. – The student will be able to:	MAFS.912.F-E.1.1 MAFS.912.F-E.1.2	SC.912.L.18.12 SC.912.E.5.2 SC.912.N.4.2 SC.912.E.5.8 SC.912.L.17
31.01 Explain the use of environmental modeling.		
31.02 Discuss how to model environmental effects.		
31.03 Discuss the effects of environmental simulations on related simulations.		
31.04 Examine environmental models available on the internet.		
32.0 Use visual modeling techniques and software to create an environmental model. – The student will be able to:	LAFS.910.W.3.7, LAFS.910.W.3.8, LAFS.910.W.3.9, LAFS.910.W.4.10, LAFS.910.L.2.3	
32.01 Demonstrate information fluency by conducting research need to create an environmental model.		
32.02 Use modeling techniques and software to create a basic environmental model.		
32.03 Communicate the relevance of the model and its impact on the real world.		

Florida Department of Education
Student Performance Standards

Course Title: **Modeling and Simulation Design**
Course Number: **9005220**
Course Credit: **1**

Course Description:

This course explores the fundamental principles of modeling and simulation design and application including modeling principles, 3D software, problem analysis, problem solving and its implications for meeting the needs of industry and society.
Hands-on activities using an entry-level modeling and simulation development tool (i.e. Auto Desk, Solid Works or other comparable software) should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation of a simple 3D simulation design to aid in the development of a professional portfolio.**

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Modeling and Simulation.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 09–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text supports the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Modeling and Simulation.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	

Florida Standards			Correlation to CTE Program Standard #
		significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge		
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing		
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Modeling and Simulation.		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1		
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1		
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1		
03.04	Model with mathematics. MAFS.K12.MP.4.1		
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1		
03.06	Attend to precision.		

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.6.1	
03.07 Look for and make use of structure. MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:

MA/LA-FS = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
33.0 Understand the production process of modeling, simulation and entertainment. – The student will be able to:	LAFS.910.L.2.3, LAFS.910.L.3.4, LAFS.910.L.3.6 LAFS.910.W.1.2, LAFS.910.W.2.4, LAFS.910.W.2.5, LAFS.910.W.2.6 LAFS.910.W.3.7, LAFS.910.W.3.8, LAFS.910.W.3.9, LAFS.910.W.4.10	
33.01 Identify the job titles associated with animation and simulation production.		
33.02 Identify various tools and equipment used to produce 3D animation.		
33.03 Understand speed and efficiency concepts.		
33.04 Understand a production pipeline.		
33.05 Identify the departments of an animation studio.		
33.06 Understand the interrelationships among departments.		
33.07 Understand basic communication concepts (verbal, memos, paperwork).		
33.08 Identify the stages of production.		
33.09 Understand studio terms and jargon.		

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
33.10 Create and organize production paperwork into design/production documentation.		
33.11 Identify target audiences, markets, and demographics.		
33.12 Demonstrate ability to write a professionally formatted script.		
33.13 Demonstrate ability to breakdown a script into production elements (cast, props).		
33.14 Demonstrate understanding of visual storytelling and how storyboards are used during production.		
34.0 Demonstrate knowledge of basic animation. – The student will be able to:		
34.01 Apply animation principles to object animation.		
34.02 Demonstrate an understanding of animation timelines.		
34.03 Demonstrate an understanding of key framing.		
34.04 Record and edit key frames.		
34.05 Demonstrate an understanding in the use of controllers.		
34.06 Render basic reference animation.		
35.0 Demonstrate knowledge of basic 3D rendering. – The student will be able to:		
35.01 Demonstrate an understanding of processor, hardware and software rendering techniques.		
35.02 Determine the final render format (size, codec, quality).		
35.03 Demonstrate an understanding of basic render settings.		
35.04 Select the range of frames to be rendered.		
36.0 Demonstrate basic understanding of modeling principles. – The student will be able to:		
36.01 Understand 3D construction theory.		
36.02 Demonstrate an understanding of primitives and parametric modeling.		
36.03 Demonstrate an understanding of non-uniform rational basis spline (NURBS), splines, and polygonal modeling.		
36.04 Demonstrate the ability to use reference images and files while modeling.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
37.0	Analyze model fidelity as related to modeling and simulation techniques. . – The student will be able to:		
37.01	Define fidelity.		
37.02	Discuss the ramifications of model fidelity parameters and their variations.		
37.03	Select the proper level of fidelity to solve a given problem.		
37.04	Identify the rationale for selecting fidelity level.		
37.05	Adjust model fidelity parameters to meet output requirements.		
38.0	Explain object models. – The student will be able to:		
38.01	Describe objects using object oriented design (OOD).		
38.02	Distinguish between abstract and real objects.		
38.03	Explain why object oriented design is an effective programming paradigm.		
38.04	Implement classes and methods.		
38.05	Describe the benefits of object oriented concepts.		
38.06	Describe object oriented design (OOD) using pseudo-code or Unified Modeling Language (UML).		
39.0	Demonstrate an understanding of mathematical modeling in relation to the production process. – The student will be able to:	MAFS.912.A-REI.1.1	
39.01	Explain mathematical modeling as processes.		
39.02	Explain the role of modeler in mathematical modeling.		
39.03	Identify job titles associated with mathematical modeling.		
39.04	Explain the modeling production pipeline as it relates to mathematical modeling.		
40.0	Explain agent-based simulation. – The student will be able to:		
40.01	Demonstrate the concept of a distributed environment.		
40.02	Explore the architecture of agent-based simulation.		
40.03	Demonstrate the uses of agent-based modeling.		

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
41.0 Demonstrate knowledge of photo editing software. – The student will be able to:		
41.01 Demonstrate understanding file formats and storage options.		
41.02 Identify parts of the software interface (menus/palettes).		
41.03 Demonstrate ability to use each of the basic tool sets.		
41.04 Demonstrate ability to import, export and save images.		
41.05 Demonstrate understanding of layers and channels.		
41.06 Demonstrate understanding of filters, effects and plug-ins.		
41.07 Demonstrate understanding of file presets.		
41.08 Demonstrate ability to select portions of an image for manipulation.		
41.09 Demonstrate ability to transform selections and images (crop, scale).		
41.10 Demonstrate ability to color correct images (brightness, hue, contrast).		
41.11 Demonstrate ability to use brushes for image creation and correction.		
41.12 Understand non-destructive and destructive operations.		
41.13 Demonstrate the ability to import, paint and export 3D objects.		
42.0 Demonstrate knowledge of video editing software. – The student will be able to:	MAFS.912.G-GMD.2.4	
42.01 Demonstrate understanding file formats and storage options.		
42.02 Identify parts of the software interface (menus/palettes).		
42.03 Demonstrate ability to use each of the basic tool sets.		
42.04 Demonstrate ability to import, export and save video.		
42.05 Demonstrate understanding of layers and compositing.		
42.06 Demonstrate understanding of filters, effects and plug-ins.		
42.07 Demonstrate understanding of file presets.		
42.08 Demonstrate understanding of rendering process.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
42.09	Demonstrate ability to transform video (crop, scale).		
42.10	Demonstrate ability to color correct images (brightness, hue, contrast).		
42.11	Demonstrate ability to use brushes for image creation and correction.		
42.12	Understand non-destructive and destructive operations.		
42.13	Demonstrate the compositing integration of rendered 3D animation with video.		
43.0	Incorporate audio assets into modeling and simulation engine. – The student will be able to:		
43.01	Describe the audio effects workflow.		
43.02	Explain audio codecs and formats used in game/simulation engines.		
43.03	Import audio into the game/simulation engine.		
43.04	Use appropriate naming conventions for audio assets.		
43.05	Describe the use of 3D and surround sound.		
43.06	Apply knowledge of distance/spatial effects, including surround sound, in a game/simulation.		
43.07	Analyze the relationship of the audio environment to the visual environment.		
44.0	Utilize basic audio production techniques, sound construction, and editing techniques as related to modeling and simulation. – The student will be able to:		
44.01	Describe the use of digital recording decks and other digital storage devices.		
44.02	Describe the function and operation of digital audio workstations.		
44.03	Edit, cut, erase, and insert sound utilizing various digital production techniques.		
44.04	Perform digital noise reduction and noise extraction via spectral display.		
44.05	Survey and discuss the use of naming conventions and temp sounds.		
44.06	Demonstrate an understanding of various audio construction software.		
44.07	Analyze and discuss methods of matching sound effects to art assets.		
44.08	Identify and categorize commonly used technology sound engine integration equipment.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	44.09 Identify and discuss resources such as sound effects libraries.		
	44.10 Examine methods of sound implementation and associated software.		
	44.11 Explain how and why digital video may be integrated into a model or simulation design.		
	44.12 Explain the roles and responsibilities of the sound design team.		
45.0	Apply industry standards for 3D animation software and user interface to create 3D simple and complex models. – The student will be able to:		
	45.01 Identify the computer requirements for 3D animation software.		
	45.02 Compare and contrast available 3D animation software.		
	45.03 Identify available file formats and protocols.		
	45.04 Explain the cinematic stage paradigm in 3D software.		
	45.05 Demonstrate an understanding of naming conventions.		
	45.06 Develop software and file backup plan.		
	45.07 Identify common icons within the software.		
	45.08 Demonstrate use of keyboard shortcuts.		
	45.09 Understand the use of a three-button mouse.		
	45.10 Identify the main windows of a 3D program.		
	45.11 Identify common window layouts.		
	45.12 Identify tool icons within the software.		
	45.13 Understand the significance of keyboard shortcut use and efficiency.		
	45.14 Demonstrate an understanding of the Euclidean Geometry Model (x-y-z coordinate system).		
	45.15 Demonstrate an understanding of attribute managers.		
	45.16 Demonstrate an understanding of layers.		
	45.17 Navigate the modeling window using pan, rotate, and zoom controls.		
	45.18 Demonstrate knowledge of selection tools (lasso, loop).		
	45.19 View objects in wireframe, gourard shading, lines, boxes and modes.		
	45.20 Demonstrate use of selection sets.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	45.21 Undo and redo an action within the program.		
	45.22 Locate the help menu system.		
46.0	Demonstrate knowledge of rigging. – The student will be able to:		
	46.01 Define rigging as a process.		
	46.02 Define the role of rigger.		
	46.03 Identify job titles associated with a rigger.		
	46.04 Identify rigging creation in the production pipeline.		
47.0	Demonstrate knowledge of basic character setup. – The student will be able to:		
	47.01 Compare and contrast rigging approaches and styles.		
	47.02 Demonstrate an understanding of the rig as it relates to the model.		
	47.03 Demonstrate an understanding of skeletal systems.		
48.0	Demonstrate knowledge of motion capture systems. – The student will be able to:		
	48.01 Understand knowledge of the history of motion capture.		
	48.02 Understand the awareness of emerging technologies in the industry.		
	48.03 Understand motion capture for 3D production.		
49.0	Use the production process and relevant modeling and simulation techniques and software to design simple 3D simulation. – The student will be able to:	LAFS.910.W.3.7, LAFS.910.W.3.8, LAFS.910.W.3.9, LAFS.910.W.4.10, LAFS.910.L.2.3	
	49.01 Demonstrate information fluency by conducting research need to design simple 3D simulation.		
	49.02 Use the production process and relevant modeling and simulation techniques and software to design simple 3D simulation.		
	49.03 Communicate the relevance of the simulation and its impact on the real world.		

Florida Department of Education
Student Performance Standards

Course Title: **Modeling and Simulation Applications**
Course Number: **9005230**
Course Credit: **1**

Course Description:

This course focuses on the acquisition of technology skills for rendering a Modeling and Simulation product, including visual simulation and engineering logistics and implementation issues as they relate to Modeling and Simulation products.

Hands-on activities using an entry-level modeling and simulation development tool (i.e. Auto Desk, Solid Works or other comparable software) should be integrated into the curriculum.

Regardless of topic sequencing, the culminating activity is the rendering of a complex 3D simulation Design to aid in the development of a professional portfolio.

Florida Standards			Correlation to CTE Program Standard #
50.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Modeling and Simulation.		
50.01	Key Ideas and Details		
	50.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	50.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	50.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
50.02	Craft and Structure		
	50.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	50.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.5	
	50.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
50.03	Integration of Knowledge and Ideas		
	50.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	50.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	50.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
36.4	Range of Reading and Level of Text Complexity		
	50.03.4	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	50.03.5	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
51.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Modeling and Simulation.		
51.01	Text Types and Purposes		
	51.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	51.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
51.02	Production and Distribution of Writing		
	51.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	

Florida Standards			Correlation to CTE Program Standard #
	51.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	51.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
51.03	Research to Build and Present Knowledge		
	51.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	51.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	51.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
51.04	Range of Writing		
	51.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
52.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Modeling and Simulation.		
	52.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	52.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	52.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	52.04	Model with mathematics. MAFS.K12.MP.4.1	

Florida Standards	Correlation to CTE Program Standard #
52.05 Use appropriate tools strategically. MAFS.K12.MP.5.1	
52.06 Attend to precision. MAFS.K12.MP.6.1	
52.07 Look for and make use of structure. MAFS.K12.MP.7.1	
52.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
MA/LA-FS = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
53.0 Demonstrate proficiency using various software applications while understanding the hardware requirements needed for modeling and simulations including processors, input/output (I/O) devices. – The student will be able to:	LASFS.1112.SL.2.5	
53.01 Compare and contrast the appropriate use of various software and visualization applications (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music).		
53.02 Demonstrate proficiency in the use of various software and visualization applications (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music).		
54.0 Build a simple scenario for experimentation or training. – The student will be able to:	LAFS.1112.W.1.3	SC.912.N.3.5
54.01 Explain the importance of scenario building in simulations.		
54.02 Identify the building blocks of scenarios.		
54.03 Design a storyboard for a simulation.		
54.04 Build a simple simulation with a finite number of variables.		
54.05 Identify the various components of a simulation.		
54.06 Run a simulation application given specific parameters.		
54.07 Explain verification and validation of a simulation.		
54.08 Review the importance of scenario building in simulations.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
54.09	Explore/develop building blocks of scenarios.		
54.10	Design a detailed storyboard for a simulation.		
54.11	Build a simulation with a level of fidelity.		
54.12	Describe the history of gaming and evolution of video games.		
54.13	Design games using programming techniques.		
54.14	Implement a simple game using appropriate software.		
55.0	Demonstrate an understanding of underlying principles of experimental simulation and how it relates to modeling and simulation. – The student will be able to:	MAFS.912.F-IF.2.4 MAFS.912.S-ID.1.1 MAFS.912.S-ID.2.6	SC.912.N.1.1 SC.912.N.3.5
55.01	Use proper attributes to develop a flowchart.		
55.02	Compare various types of studies (i.e. survey, observation, experiment).		
55.03	Identify and explain an experimental design process.		
55.04	Set realistic objectives for the experiment.		
55.05	Determine the appropriate response or output.		
55.06	Select process variables or design parameters (control factors), noise factors and the interactions among the process variables of interest.		
55.07	Perform experimental design execution.		
55.08	Check that the data are consistent with the experimental assumptions.		
55.09	Interpret and present results.		
56.0	Demonstrate an understanding of 3D modeling and simulation software engines. – The student will be able to:		SC.912.P.10.2 SC.912.P.12.2, SC.912.P.12.3, SC.912.P.12.5, SC.912.P.12.6
56.01	Understand concepts of the transfer of training.		
56.02	Understand mathematics of physics based real-time simulators.		
56.03	Describe components of visual systems (image generation, data bases and displays).		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	56.04 Describe theory of motion/control loading simulation and cue synchronization.		
	56.05 Describe trainee station design, sensor simulation and instructor/operator station design.		
	56.06 Understand and utilize collision detection.		
57.0	Understand systems engineering for simulators. – The student will be able to:		
	57.01 Understand the systems engineering life cycle process and terminology.		
	57.02 Identify the major milestones in the system life cycle.		
	57.03 Understand the Systems Engineering life cycle process and terminology including the following: system requirements analysis, system design, hardware design and development, software design and development, system integration, configuration management, acceptance testing and contractor logistics support.		
	57.04 Identify major milestones in the system life cycle such as preliminary/critical design reviews, establish function baseline, allocated baseline, product baseline and ready for training (RFT).		
58.0	Use real time technology to model and simulate environments. The student will be able to:		
	58.01 Identify simulator applications.		
	58.02 Identify where team simulators would be appropriate.		
	58.03 Identify where individual simulators would be appropriate.		
	58.04 Understand where and why networked simulators are used.		
59.0	Demonstrate an understanding of underlying principles of numerical analysis and how it relates to modeling and simulation. – The student will be able to:	MAFS.912.A-REI.1.1	
	59.01 Apply logical reasoning skills to solve real-world problems through the development of mathematical models.		
	59.02 Design a step-by-step plan (algorithm) to solve a given problem.		
	59.03 Write program specifications that define the constraints of a given problem.		
	59.04 Use a programmable calculator.		
	59.05 Write an algorithm to solve mathematical problems using formulas, equations, and functions.		
60.0	Analyze numerical characteristics of univariate data sets to describe patterns and departure from patterns, using statistics for various distributions. – The student will be able to:	MAFS.912.S-ID.2.3, MAFS.912.S-ID.2.4,	SC.912.N.2.5

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
		MAFS.912.S-ID.2.5, MAFS.912.S-ID.2.6	
60.01	Define terminology associated with data collection, statistics and graphing.		
60.02	Differentiate between the various methods of data collection.		
60.03	Explain the uses of random number generators.		
60.04	Recognize various sources of bias in data collection.		
60.05	Prepare a sample data collection.		
60.06	Determine the numerical characteristics of a data set and analyze data.		
60.07	Interpret tables of statistics.		
60.08	Create bar charts and pie graphs with appropriate software.		
60.09	Analyze the data to solve a presented problem.		
60.10	Apply problem analysis using flowcharts or the Unified Modeling Language (UML).		
61.0	Use probabilities (relative frequency and theoretical), to plan and conduct an experiment that will address control, randomization and measurement of experimental error. – The student will be able to:	MAFS.912.S-CP.1.1, MAFS.912.S-CP.1.2, MAFS.912.S-CP.1.3, MAFS.912.S-CP.1.4, MAFS.912.S-CP.1.5, MAFS.912.S-CP.2.6, MAFS.912.S-CP.2.7, MAFS.912.S-CP.2.8, MAFS.912.S-CP.2.9, MAFS.912.S-MD.1.1, MAFS.912.S-MD 1.2, MAFS.912.S-MD 1.3, MAFS.912.S-MD.1.4, MAFS.912.S-MD 2.5, MAFS.912.S-MD2.6, MAFS.912.S-MD2.7	
61.01	Define and explain probability rules and event terminology.		
61.02	Identify events as complementary, dependent, independent, mutually exclusive or not mutually exclusive.		
61.03	Analyze categorical data using two-way tables to describe patterns and departure from patterns and to find marginal frequency and relative frequencies.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
61.04	Distinguish between empirical and theoretical probability.		
61.05	Calculate probabilities.		
61.06	Explain the law of large numbers.		
61.07	Calculate probabilities using addition rules.		
61.08	Calculate probabilities using the multiplications rules.		
61.09	Define the Fundamental Counting Rule, Permutation, and Combination.		
61.10	Perform calculations using the Fundamental Counting Rule, Permutation and Combination.		
61.11	Distinguish when one would use a permutation and when one would use a combination.		
61.12	Define experimental terminology.		
61.13	Explain potential reasons for experimental error.		
61.14	Demonstrate an understanding of the principles of probability by performing a probability experiment within the classroom.		
62.0	Use programming to develop modeling and simulation applications. – The student will be able to:		
62.01	Utilize reference manuals.		
62.02	Write programs according to recognized programming standards.		
62.03	Write internal documentation statements as needed in the program source code.		
62.04	Code programs in high-level languages for game/simulation applications.		
62.05	Write code that accesses sequential, random, and direct files.		
62.06	Code programs using logical statements (e.g., If-Then-Else, Do...While).		
62.07	Enter and modify source code using a program language editor.		
62.08	Code routines within programs that validate input data.		
62.09	Use the rounding function in calculations within programs.		
62.10	Write programs as part of a development team.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	62.11 Write event-driven programs.		
	62.12 Write programs using timed-event strategies and methodologies.		
	62.13 Write programs that include score keeping.		
	62.14 Write programs that display text.		
	62.15 Write programs that use composite graphic objects.		
	62.16 Write programs that load a bitmap for background.		
	62.17 Write programs that utilize a sprite handler.		
	62.18 Write programs that use animation.		
	62.19 Write programs that use scrolling.		
	62.20 Write programs that use transparency.		
	62.21 Write documentation to assist operators and end-users.		
	62.22 Follow established documentation standards.		
	62.23 Update existing documentation to reflect program changes.		
63.0	Test programs related to modeling and simulation. – The student will be able to:		
	63.01 Perform debugging activities.		
	63.02 Evaluate program test results.		
	63.03 Use trace routines of compilers to assist in program debugging.		
	63.04 Compile and run programs.		
	63.05 Create a stable code base.		
	63.06 Develop data for use in program testing.		
	63.07 Distinguish among the different types of program and design errors.		
64.0	Perform program maintenance to troubleshoot and optimize code. – The student will be able to:		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	64.01 Review requested modification of programs and establish a plan of action.		
	64.02 Design needed modifications in compliance with established standards.		
	64.03 Code, test, and debug modifications prior to updating production code.		
	64.04 Update production programs and documentation with changes.		
	64.05 Analyze output to identify and annotate errors or enhancements.		
65.0	Plan program design using object oriented programming (OOP) for modeling and simulation. – The student will be able to:		
	65.01 Formulate a plan to determine program specifications individually or in groups.		
	65.02 Use a graphical representation or pseudo code to represent the structure in a program or subroutine.		
	65.03 Design programs to solve problems using problem-solving strategies.		
66.0	Demonstrate knowledge of non-uniform rational b-splines (NURBS) modeling. – The student will be able to:	MAFS.M12.G-MG.1.1 MAFS.M12.G-MG.1.2, MAFS.M12.G-MG.1.3, MAFS.912.A-REI.3.5	
	66.01 Demonstrate an understanding of points, vertices, edges, and polygons.		
	66.02 Demonstrate an understanding of poly-count.		
	66.03 Demonstrate an understanding of primitives.		
	66.04 Define parametric primitives.		
	66.05 Locate an object's properties, attributes, and coordinates.		
	66.06 Demonstrate understanding of Non uniform rational b-splines (NURBS).		
	66.07 Demonstrate understanding of splines and generators (extrude, lathe, sweep).		
	66.08 Understand the use of hierarchy.		
	66.09 Demonstrate an understanding of Boolean objects.		
	66.10 Demonstrate an understanding of Null objects.		
	66.11 Demonstrate an understanding of scene management (hiding-unhiding).		

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
66.12 Demonstrate an understanding of arrays.		
67.0 Demonstrate knowledge of polygon modeling. – The student will be able to:		
67.01 Demonstrate an understanding of N-gons.		
67.02 Demonstrate an understanding of subdivision.		
67.03 Demonstrate basic polygon editing and manipulation.		
67.04 Demonstrate knowledge of point management (location).		
67.05 Demonstrate the ability to create polygonal models from points.		
67.06 Demonstrate an understanding of cutting/division tools.		
67.07 Demonstrate an understanding of extrudes.		
67.08 Demonstrate an understanding of symmetry.		
67.09 Demonstrate an understanding of hyper NURBS.		
67.10 Demonstrate an understanding of basic deformers (bend, twist, melt).		
68.0 Demonstrate knowledge of animation principles as it relates to the underlying physics of modeling. – The student will be able to:		
68.01 Demonstrate an understanding of the principle of squash and stretch.		
68.02 Demonstrate an understanding of the principle of anticipation.		
68.03 Demonstrate an understanding of the principle of staging.		
68.04 Demonstrate an understanding of the principle of straight ahead action and pose to pose.		
68.05 Demonstrate an understanding of the principle of follow through and overlapping action.		
68.06 Demonstrate an understanding of the principle of slow in and slow out.		
68.07 Demonstrate an understanding of the principle of arcs.		
68.08 Demonstrate an understanding of the principle of secondary action.		
68.09 Demonstrate an understanding of the principle of timing.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	68.10 Demonstrate an understanding of the principle of exaggeration.		
	68.11 Demonstrate an understanding of the principle of solid drawing.		
	68.12 Demonstrate an understanding of the principle of appeal.		
69.0	Use the production process and relevant modeling and simulation techniques and software to render a complex 3D simulation. – The student will be able to:	LAFS.910.W.3.7, LAFS.910.W.3.8, LAFS.910.W.3.9, LAFS.910.W.4.10, LAFS.910.L.2.3	
	69.01 Demonstrate information fluency by conducting research need to render a complex 3D simulation.		
	69.02 Use the production process and relevant modeling and simulation techniques and software to render a complex 3D simulation.		
	69.03 Communicate the relevance of the simulation and its impact on the real world.		

Florida Department of Education
Student Performance Standards

Course Title: **Modeling and Simulation Innovation and Prototyping**
Course Number: **9005240**
Course Credit: **1**

Course Description:

This course provides students with the extended modeling and simulation content and skills essential for innovating, designing and producing prototypes.

Hands-on activities using an entry-level modeling and simulation development tool (i.e. Auto Desk, Solid Works or other comparable software) should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the completion of a capstone project to demonstrate competency in the field of modeling and simulation research, design and practice and to aide in the completion of a professional portfolio.**

Florida Standards	Correlation to CTE Program Standard #
50.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Modeling and Simulation.	
50.1 Key Ideas and Details	
50.1.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
50.1.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
50.1.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
50.2 Craft and Structure	
50.2.1 Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
50.2.2 Analyze how the text structures information or ideas into categories or	

Florida Standards	Correlation to CTE Program Standard #
hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
50.2.3 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
50.3 Integration of Knowledge and Ideas	
50.3.1 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
50.3.2 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
50.3.3 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
50.4 Range of Reading and Level of Text Complexity	
50.4.1 By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. 50.4.2 By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
51.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Modeling and Simulation.	
51.1 Text Types and Purposes	
51.1.1 Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
51.1.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
51.2 Production and Distribution of Writing	
51.2.1 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	

Florida Standards	Correlation to CTE Program Standard #
51.2.2 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
51.2.3 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
51.3 Research to Build and Present Knowledge	
51.3.1 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
51.3.2 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
51.3.3 Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
51.4 Range of Writing	
51.4.1 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
52.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Modeling and Simulation.	
52.1 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
52.2 Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
52.3 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
52.4 Model with mathematics. MAFS.K12.MP.4.1	
52.5 Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.5.1	
52.6 Attend to precision. MAFS.K12.MP.6.1	
52.7 Look for and make use of structure. MAFS.K12.MP.7.1	
52.8 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
MA/LA-FS = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
70.0 Explain and utilize project management and logistics to create and develop 3D modeling and simulation products. – The student will be able to:		
70.01 Explain the process groups and knowledge areas that comprise the Project Management body of knowledge using appropriate PMBOK terminology.		
70.02 Define the roles of a Project Manager and stakeholders.		
70.03 Discuss the project life cycle and scope.		
70.04 Create a work breakdown structure (WBS) making estimates of the required work durations and resource allocations using a performance measurement baseline (PMB) for a project.		
70.05 Brainstorm potential risks and develop a risk management plan for the project.		
71.0 Understand the implications of intellectual property rights, copyright laws and plagiarism on creative assets. – The student will be able to:	LAFS.1112.SL.2.4, LAFS.1112.SL.2.5 LAFS.1112.W.1.2, LAFS.1112.W.2.4, LAFS.1112.W.2.5, LAFS.1112.W.2.6 LAFS.1112.W.3.7, LAFS.1112.W.3.8, LAFS.1112.W.4.10	
71.01 Practice ethical behaviors regarding copyright, citation, and plagiarism.		
71.02 Understand the process of patent application filing, product trials, and communication techniques to describe their product.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
71.03	Explain the purposes of copyrights, trademarks, and patents and understand the limitations and expectations.		
71.04	Explore and examine components of intellectual property such as patents, copyrights, trademarks, and trade secrets.		
71.05	Understand “Fair Use and Fair Dealing” practices.		
71.06	Understand the transfer and licensing of creative works.		
71.07	Understand the use of “exclusive rights” to intellectual creations.		
71.08	Utilize digital watermarking.		
72.0	Apply the principles of entrepreneurism to Modeling and Simulation and demonstrate an understanding of the design and production of prototypes from conception to mass production. – The student will be able to:	LAFS.1112.SL.2.4, LAFS.1112.SL.2.5 LAFS.1112.W.1.2, LAFS.1112.W.2.4, LAFS.1112.W.2.5, LAFS.1112.W.2.6 LAFS.1112.W.3.7, LAFS.1112.W.3.8, LAFS.1112.W.4.10	
72.01	Identify the usefulness of technology applications.		
72.02	Determine the design architecture.		
72.03	Formulate and test a proof of concept.		
72.04	Understand the value of partnerships and sub-contracting of production and distribution of product.		
72.05	Develop an understanding of the production process.		
72.06	Understand return on investment (ROI) concepts.		
72.07	Examine market analysis of product.		
72.08	Develop a comprehensive business model and present a clear and professional proposal to investors.		
73.0	Use innovative technologies to create prototypes of models. – The student will be able to:		
73.01	Identify emerging technologies to develop prototypes.		
73.02	Compare and contrast the benefits and limitations of using various prototyping methods and costs.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
73.03	Use emerging technologies to create a prototype (i.e. 3D printing software, 3D printers or other applicable devices).		
74.0	Create and design a vector or bitmap art reference to develop a texture map to build a 3D model for simulation. – The student will be able to:	MAFS.912.G-MG.1, MAFS.912.N-VM.1, MAFS.912.G-GMD2.4, MAFS912.G-MG.1.1, MAFS912.G-MG1.3 MAFS.912.G-GMD.2.4	SC.912.P.12.1
74.01	Know the difference between vectors and bitmaps.		
74.02	Demonstrate an understanding of various 2D art programs.		
74.03	Utilize the programs tools and brushes.		
74.04	Know the importance of layers.		
74.05	Identify file formats.		
74.06	Use digital media software to create a vector of bitmap reference object.		
74.07	Import a reference object into 3D modeling software.		
74.08	Convert a reference object to 3D.		
74.09	Create simple texture in/with a bitmap program.		
75.0	Demonstrate the use of experimental and engineering design techniques to produce real world or industry simulations. – The students will be able to:	MAFS.912.F-BF.1.1, MAFS.912.F-BF.1.2 LAFS.1112.RL.3.7	
75.01	Understand the design requirements and limitations of a 2D modeling and simulation engine.		
75.02	Demonstrate the use of various mediums and mixed media (traditional or digital) in a 2D modeling and simulation.		
75.03	Demonstrate the ability to create character and object views for animation.		
75.04	Break down animation into a series of pictures to import animation to a modeling and simulation engine.		
75.05	Demonstrate the effective use of animation loops and cycles in a modeling and simulation engine.		
75.06	Demonstrate an understanding of the value of timing to convey character motion.		
75.07	Demonstrate the effective use of animation arcs for the articulation of body elements.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
75.08	Demonstrate the use of principles of animation such as anticipation, squash, stretch, weight, exaggeration and overlapping and secondary motion.		
75.09	Demonstrate the use of phonemes to display speech in animation.		
76.0	Demonstrate an understanding of underlying principles of discreet event simulation and how it relates to modeling and simulation. – The student will be able to:	MAFS.912.S-ID1.1, MAFS.912.S-ID1.2, MAFS.912.S-ID1.3, MAFS.912.S-ID1.4	
76.01	Identify discrete event simulations.		
76.02	Use simulation as an analysis tool.		
76.03	Describe the output distribution.		
76.04	Use historical/empirical data.		
76.05	Interpret summary statistics.		
76.06	Interpret confidence and prediction (certainty) intervals.		
76.07	Identify sources and impact of error in simulations.		
76.08	Describe relationships among variables.		
76.09	Describe the effect of correlation on simulation results.		
77.0	Implement multimedia programming as it relates to modeling simulation using a gaming engine. – The student will be able to:		
77.01	Demonstrate proficiency in creating multiple composite objects.		
77.02	Demonstrate proficiency in moving composite graphics objects.		
77.03	Demonstrate proficiency in rotating composite graphics objects manually.		
77.04	Distinguish between flock and flee artificial intelligence algorithms.		
77.05	Write programs that use blitting.		
77.06	Identify the basic constructs used in bounding box collision algorithms.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
77.07	Identify the basic constructs used in truer bounding box collisions.		
77.08	Demonstrate proficiency in creating a bouncing simulation.		
77.09	Simulate pattern-based movement.		
77.10	Simulate multiple sprites movement.		
77.11	Identify the basic constructs used in keyboard input.		
77.12	Identify the basic constructs used in mouse input.		
77.13	Identify the basic constructs used in double buffering.		
78.0	Use innovative technologies to create prototypes of models. – The student will be able to:		
78.01	Identify emerging technologies to develop prototypes.		
78.02	Compare and contrast the benefits and drawbacks of using various prototyping methods and costs.		
78.03	Use emerging technologies to create a prototype (i.e. 3D printing software, 3D printers or other applicable devices).		

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Java Development & Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9007200
CIP Number	0511020313
Grade Level	9-12, 30, 31
Standard Length	8 credits
Teacher Certification	BUS ED 1 @2 COMP SCI 6 COMP PROG 7G
CTSO	FBLA BPA SkillsUSA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the fundamentals of programming and software development; procedural and object-oriented programming; creating regular and specialized applications using the Java programming language, including testing, monitoring, debugging, documenting, and maintaining Java computer applications.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points, with OCPs A, B, and C comprising the Software Development Core.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	9007210 9007220	Foundations of Programming Procedural Programming	1 credit 1 credit	15-1131	3 3	VO
C	9007230	Object-Oriented Programming Fundamentals	1 credit	15-1131	3	VO
D	9007240 9007250 9007260 9007270	Java Programming Essentials Applied Object-Oriented Java Programming Java Database Programming Java Programming Capstone	1 credit 1 credit 1 credit 1 credit	15-1131	3 3 3 3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9007210	2/87 2%	7/80 9%	22/83 27%	4/69 6%	23/67 34%	4/70 6%	3/69 4%	23/82 28%	6/66 9%	26/74 35%	4/72 6%
9007220	21/87 24%	21/80 26%	2/83 2%	21/69 30%	2/67 3%	20/70 29%	21/69 30%	2/82 2%	16/66 24%	2/74 3%	21/72 30%
9007230	20/87 23%	20/80 25%	1/83 1%	20/69 29%	1/67 1%	20/70 29%	20/69 29%	1/82 1%	15/66 23%	1/74 1%	21/72 28%
9007240	#	#	#	#	#	#	#	#	#	#	#
9007250	#	#	#	#	#	#	#	#	#	#	#
9007260	#	#	#	#	#	#	#	#	#	#	#
9007270	#	#	#	#	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	40/45 89%
9007210	11/67 16%	10/75 13%	10/54 19%	#	#	#	#
9007220	14/67 21%	10/75 13%	11/54 20%	#	#	#	#
9007230	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
9007240	#	#	#	#	#	#	#
9007250	#	#	#	#	#	#	#
9007260	#	#	#	#	#	#	#
9007270	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Java Development & Programming.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Java Development & Programming.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
19.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
20.0 Distinguish between iterative and non-iterative program control structures.
21.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
22.0 Describe the processes, methods, and conventions for software development and maintenance.
23.0 Explain the types, uses, and limitations of testing for ensuring quality control.
24.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
25.0 Describe information security risks, threats, and strategies associated with software development.
26.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
27.0 Solve problems using critical thinking skills, creativity and innovation.
28.0 Use information technology tools.

29.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Java Development & Programming.
30.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Java Development & Programming.
31.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.
32.0 Design a computer program to meet specific physical, operational, and interaction criteria.
33.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
34.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
35.0 Create a unit test plan, implement the plan, and report the results of testing.
36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
37.0 Describe the importance of professional ethics and legal responsibilities.
38.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
39.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
40.0 Design, document, and create object-oriented computer programs.
41.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
42.0 Construct statements that declare, initialize, and modify different types of variables used in Java programs.
43.0 Describe the types and characteristics of lexical units in the Java programming language.
44.0 Describe the data types employed in Java programs.
45.0 Construct Java statements that employ the use of various operators.
46.0 Write executable statements using Java.
47.0 Describe variable scope and its implications in Java programming.
48.0 Apply common Java programming style guidelines and conventions.
49.0 Demonstrate use of the compiler and interpreter through command line interface.
50.0 Construct conditional control statements in Java.
51.0 Construct iterative control statements in Java.
52.0 Use nested loop iterative control statements in Java.
53.0 Produce input and output for Java programs.
54.0 Use packages and import statements in a Java program.
55.0 Create a Java program that uses methods.
56.0 Create a Java program that uses parameters in methods.
57.0 Describe and use recursion in a Java program.
58.0 Construct Java statements that use the String class to manipulate String data.
59.0 Construct Java statements that use Classes.
60.0 Manage class relationships.
61.0 Construct Java statements that illustrate the use of multiplicities in class relationships.
62.0 Use object references.
63.0 Describe the types of arrays and construct Java statements that illustrate the use and manipulation of multi-dimensional and jagged arrays.
64.0 Construct Java statements that illustrate different ways of using inheritance.
65.0 Construct Java statements that use collections.
66.0 Write Java code that uses the Iterator and List interfaces.

67.0 Create Java code that includes exception handling code.
68.0 Create Java code that uses the Object class.
69.0 Use standard library classes that comprise the Java API.
70.0 Create Java code that uses exceptions to improve program quality.
71.0 Describe Java 2 Micro Edition (J2ME) uses, characteristics, and constraints.
72.0 Create and convert classes using Unified Modeling Language (UML).
73.0 Create programs that use of Remote Method Invocation (RMI) and other server technologies associated with Relational Database Management Systems (RDMS) and Structured Query Language (SQL).
74.0 Demonstrate an understanding of Java Integration APIs, including Java Message Service (JMS), Enterprise JavaBeans (EJB), and Java Naming and Directory Interface (JNDI).
75.0 Demonstrate an understanding of Java Client APIs, including the Abstract Window Toolkit (AWT), Swing, and Java applet.
76.0 Understand and apply Java 2 Enterprise Edition (J2EE) Server Solutions.
77.0 Create a database application using the Java programming language.
78.0 Create a graphical user interface application using the Java programming language.
79.0 Create a web-based application using the Java programming language.
80.0 Write code to perform common and union database queries using SQL and Java.
81.0 Implement Java program statements using objects.
82.0 Utilize debugging tools and write error handlers.
83.0 Demonstrate file input/output (I/O).
84.0 Utilize API functions.
85.0 Test and debug databases.
86.0 Successfully work as a member of a software development team.
87.0 Manage time according to a plan.
88.0 Keep acceptable records of progress problems and solutions.
89.0 Plan, organize, and carry out a project plan.
90.0 Manage resources.
91.0 Use tools, materials, and processes in an appropriate and safe manner.
92.0 Demonstrate an understanding of the software development process.
93.0 Research content related to the project and document the results following industry conventions.
94.0 Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience.
95.0 Demonstrate competency in the area of expertise related to developing computer software using the Java programming language.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Foundations of Programming**
Course Number: **9007210**
Course Credit: **1**

Course Description:

This course introduces concepts, techniques, and processes associated with computer programming and software development. After successful completion of Programming Foundations and Procedural Programming, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Java Development & Programming.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question	

Florida Standards			Correlation to CTE Program Standard #
		the author seeks to address. LAFS.910.RST.2.6	
	01.03	Integration of Knowledge and Ideas	
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
	01.04	Range of Reading and Level of Text Complexity	
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0		Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Java Development & Programming.	
	02.01	Text Types and Purposes	
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.02	Production and Distribution of Writing	
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Java Development & Programming].		
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:		
18.01 Describe the evolution of programming and programming careers.	MAFS.912.A-REI.1.1	
18.02 Identify tasks performed by programmers.	MAFS.912.N-Q.1.1	
18.03 Describe how businesses use computer programming to solve business problems.	MAFS.912.A-REI.1.1	
18.04 Investigate job opportunities in the programming field.		
18.05 Explain different specializations and the related training in the computer programming field.	MAFS.912.A-REI.1.1 MAFS.912.G-SRT.1.2	
18.06 Explain the need for continuing education and training of computer programmers.	MAFS.912.A-REI.1.1	
18.07 Explain enterprise software systems and how they impact business.	MAFS.912.A-REI.1.1	
18.08 Describe ethical responsibilities of computer programmers.	MAFS.912.A-REI.1.1	
18.09 Describe the role of customer support to software program quality.	MAFS.912.A-REI.1.1	
18.10 Identify credentials and certifications that may improve employability for a computer programmer.	MAFS.912.N-Q.1.1	
18.11 Identify devices, tools, and other environments for which programmers may develop software.	MAFS.912.G-CO.4.12; MAFS.912.N-Q.1.1	
19.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:		
19.01 Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.	MAFS.912.N-Q.1.2	
19.02 Explain the types and uses of variables in programs.	MAFS.912.A-REI.1.1; MAFS.912.A-SSE.1.1	
19.03 Determine the best data type to use for given programming problems.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.04	Identify the types of operations that can be performed on different data types.	MAFS.912.N-Q.1.1	
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
19.06	Explain how computers store different data types in memory.	MAFS.912.A-REI.1.1	
19.07	Demonstrate the difference between "data" and "information".		
19.08	Use different number systems to represent data.	MAFS.912.N-Q.1.1	
19.09	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.	MAFS.912.A-REI.1.1	
19.10	Use Boolean logic to perform logical operations.		
20.0	Distinguish between iterative and non-iterative program control structures–The student will be able to:		
20.01	Explain non-iterative programming structures (*e.g.*, if, if/else and their uses.	MAFS.912.A-REI.1.1	
20.02	Explain iterative programming structures (*e.g.*, while, do/while) and their uses.	MAFS.912.A-REI.1.1	
21.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:		
21.01	Identify the characteristics, uses, and limits of low-level programming languages.	MAFS.912.N-Q.1.1	
21.02	Identify the characteristics, uses, and limits of high-level programming languages.	MAFS.912.N-Q.1.1	
21.03	Identify the characteristics, uses, and limits of rapid development programming languages.	MAFS.912.N-Q.1.1	
21.04	Describe object-oriented concepts.	MAFS.912.A-REI.1.1	
21.05	Explain the characteristics of procedural and object-oriented programming languages.	MAFS.912.A-REI.1.1	
21.06	Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).	MAFS.912.G-SRT.1.2	
22.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:		
22.01	Describe and explain tools used in software development.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	
22.02	Describe the stages of the program life cycle.	MAFS.912.A-REI.1.1	
22.03	Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).	MAFS.912.G-SRT.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
22.04	List and explain the steps in the program development cycle.	MAFS.912.A-REI.1.1	
22.05	Describe different types of documentation used in the program development cycle (*e.g.*, requirements document, program design documents, test plans).	MAFS.912.N-Q.1.1	
22.06	Describe the on-going need for program maintenance.	MAFS.912.A-REI.1.1	
22.07	Describe different methods companies use to facilitate program updates for enhancements and defects (*e.g.*, how customers receive patches, updates, new versions, upgrades).	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
22.08	Describe different methods used to facilitate version control and change management.	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
23.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:		
23.01	Explain the uses and limits of testing in ensuring program quality.	MAFS.912.A-REI.1.1	SC.912.N.1.1
23.02	Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.1	
23.03	Describe data and the use of test plans/scripts to be used in program testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
23.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
23.05	Identify the data to be used for boundary conditions.	MAFS.912.N-Q.1.1	
23.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	SC.912.N.1.1
24.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:		
24.01	Describe different design methodologies and their uses (*e.g.*, object-oriented design, structured design, and rapid application development).	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.3.5
24.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).	MAFS.912.A-REI.1.1	SC.912.N.1.1
24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.	MAFS.912.A-REI.1.1	
24.04	Participate and contribute to a design review of a program design developed using a common program design tool (*e.g.*, UML, flowcharts, design documents, pseudocode).	MAFS.912.A-CED.1.1	SC.912.N.1.1, SC.912.N.1.3, SC.912.N.2.4, SC.912.N.4.2
24.05	Write a program design document using UML or other standard design methodology.	MAFS.912.A-CED.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
24.06	Define input and output for a program module using UML or other standard design methodology.	MAFS.912.F-IF.1.1	
25.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:		
25.01	Explain the security risks to personal and business computer users.	MAFS.912.S-IC.2.6	
25.02	Identify different types of threats to computer systems.	MAFS.912.N-Q.1.1	
25.03	Identify methods to protect against different threats to computer systems.	MAFS.912.N-Q.1.1	
25.04	Understand the importance of a disaster/emergency response plan.		
25.05	Identify alternative methods for data storage and backup (*e.g.*, mirroring, fail-over, high availability, types of backups).	MAFS.912.N-Q.1.1	
26.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
26.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		SC.912.N.1.9, SC.912.N.1.10
26.02	Locate, organize and reference written information from various sources.		SC.912.N.1.1.6
26.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	MAFS.912.A-CED.1.1	SC.912.N.1.1.9, SC.912.N.1.1.10
26.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.	MAFS.912.G-SRT.1.2	SC.912.N.1.1.5, SC.912.N.1.1.6, SC.912.N.1.1.8
26.05	Apply active listening skills to obtain and clarify information.		
26.06	Develop and interpret tables and charts to support written and oral communications.	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.1 MAFS.912.F-IF.3.9	SC.912.N.1.1.6-11
26.07	Exhibit public relations skills that aid in achieving customer satisfaction.		
27.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
27.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.	MAFS.912.G-CO.3.9	SC.912.N.1.1
27.02	Employ critical thinking and interpersonal skills to resolve conflicts.	MAFS.912.G-CO.3.9	SC.912.N.1.3, SC.912.N.4.1
27.03	Identify and document workplace performance goals and monitor progress toward those goals.	MAFS.912.N-Q.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
27.04 Conduct technical research to gather information necessary for decision-making.	MAFS.912.S-IC.2.6; MAFS.912.S-IC.1.1	SC.912.N.1.3, SC.912.N.1.1.5
28.0 Use information technology tools. – The student will be able to:		
28.01 Use personal information management (PIM) applications to increase workplace efficiency.		
28.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.	MAFS.912.G-CO.4.12	
28.03 Employ computer operations applications to access, create, manage, integrate, and store information.	MAFS.912.Z-CED.1.1	
28.04 Employ collaborative/groupware applications to facilitate group work.		

Florida Department of Education
Student Performance Standards

Course Title: **Procedural Programming**
Course Number: **9007220**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts with a focus on the creation of software applications employing procedural programming techniques. After successful completion of Programming Foundations and Procedural Programming, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Java Development & Programming.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Java Development & Programming.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.0 Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:		
32.01 Choose appropriate data types depending on the needs of the program.	MAFS.912.N-Q.1.1	
32.02 Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).	MAFS.912.N-Q.1.2	
32.03 Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).	MAFS.912.A-REI.1.1	
32.04 Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).	MAFS.912.N-Q.1.1	
32.05 Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).	MAFS.912.N-Q.1.1	
33.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:		
33.01 Use appropriate naming conventions to define program variables and modules (methods, functions).	MAFS.912.N-Q.1.1	
33.02 Use a program editor to write the source code for a program.	MAFS.912.A-REI.1.1	
33.03 Write programs that use selection structures (*e.g.*, if, if/else).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.04 Write programs that use repetition structures (*e.g.*, while, do/while).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.05 Write programs that use nested structures.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.06 Use internal documentation (*e.g.*, single-line and multi-line comments, program headers, module descriptions, meaningful variable and function/module names) to		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	document a program according to accepted standards.		
33.07	Compile and run programs.	MAFS.912.A-REI.1.1	
33.08	Write programs that use standard arithmetic operators with different numerical data types.	MAFS.912.N-Q.1.1; MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2 MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
33.09	Write programs that use standard logic operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.10	Write programs that use a variety of common data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2 MAFS.912.N-Q.1.1, MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
33.11	Write programs that perform data conversion between standard data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.12	Write programs that define, use, search, and sort arrays.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.13	Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.14	Demonstrate understanding and use of appropriate variable scope.	MAFS.912.A-REI.1.1	
34.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:		
34.01	Write programs that perform user input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).	MAFS.912.A-CED.1.1;	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		MAFS.912.A-CED.1.2	
	34.03 Write program modules such as functions, subroutines, or methods.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.04 Write program modules that accept arguments.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.05 Write program modules that return values.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.06 Write program modules that validate arguments and return error codes.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.07 Write interactive programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.08 Write programs that use standard libraries to enhance program function.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.		
35.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:		
	35.01 Write a unit test plan that identifies the input data and expected results for program tests.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	35.02 Test and debug programs, including programs written by others.	MAFS.912.A-REI.1.1	
	35.03 Write a test report that identifies the results of testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	35.04 Trace through the function of a program to ensure valid operation.	MAFS.912.N-Q.1.1	
	35.05 Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).	MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.2	
	35.06 Create a disaster/emergency response plan for a computer system.	MAFS.912.A-CED.1.1; MAFS.912.A-	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		CED.1.2	
36.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
36.01	Employ leadership skills to accomplish organizational goals and objectives.		
36.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
36.03	Conduct and participate in meetings to accomplish work tasks.		
37.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
37.01	Evaluate and justify decisions based on ethical reasoning.	MAFS.912.S-IC.2.6	
37.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	MAFS.912.S-IC.2.6	
37.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	MAFS.912.S-IC.2.6; MAFS.912.A-REI.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Object-Oriented Programming Fundamentals**
Course Number: **9007230**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts with a focus on the creation of software applications employing object-oriented programming techniques. After successful completion of Object-Oriented Programming Fundamentals, students will have met Occupational Completion Point C, Computer Programmer, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Java Development & Programming.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Java Development & Programming.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
38.0 Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:		
38.01 Demonstrate the understanding and use of classes, objects, attributes, and behaviors.	MAFS.912.A-REI.1.1	
38.02 Demonstrate the understanding and use of inheritance.	MAFS.912.A-REI.1.1	
38.03 Demonstrate the understanding and use of data encapsulation.	MAFS.912.A-REI.1.1	
38.04 Demonstrate the understanding and use of polymorphism.	MAFS.912.A-REI.1.1	
39.0 Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements. – The student will be able to:		
39.01 Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.	MAFS.912.A-REI.1.1	
39.02 Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.	MAFS.912.A-REI.1.1	
39.03 Design an object-oriented program using UML or another standard design methodology.	MAFS.912.H-CED.1.1	
39.04 Work with other team members to develop a project plan for a program.	MAFS.912.A-REI.1.1	
39.05 Work with other team members to write a design document for a program with multiple functions and shared data.	MAFS.912.A-REI.1.1	
39.06 Participate in design meetings that review program design documents for conformance to program requirements.	MAFS.912.S.IC.2.6	
39.07 Estimate the time to develop a program or module.	MAFS.912.S.IC.2.6	
40.0 Design, document, and create object-oriented computer programs. – The student will be able to:		
40.01 Compare and contrast recursive functions to other iterative methods.	MAFS.912.G-SRT.1.2	
40.02 Understand the implementation of character strings in the programming language.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
40.03 Write programs that perform string processing (*e.g.*, string manipulation, string compares, concatenation).	MAFS.912.A-REI.1.1	
40.04 Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.05 Write object-oriented programs that use inheritance.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.06 Write object-oriented programs that use polymorphism.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.07 Develop class constructors.	MAFS.912.S-MD.1.3	
40.08 Write programs that define and use program constants.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.09 Write programs that perform error handling.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.10 Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.	MAFS.912.S-IC.2.6	
40.11 Write programs that perform dynamic memory allocation.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.12 Write programs that perform effective management of dynamically allocated memory.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.13 Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal, external) related to version control.	MAFS.912.A-REI.1.1	
40.14 Write programs that use complex data structures (*e.g.*, stacks, queues, trees, linked lists).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.15 Write programs that are event-driven.	MAFS.912.A-CED.1.1; MAFS.912.A-	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		CED.1.2	
	40.16 Write programs that perform file input and output (*i.e.*, sequential and random access file input/output).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	40.17 Perform basic database commands including connect, open, select, and close.	MAFS.912.A-REI.1.1	
41.0	Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results. – The student will be able to:		
	41.01 Develop a test plan for an object-oriented program.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.02 Write test plans for event-driven programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.03 Write test plans for programs that perform file input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.04 Perform test and debug activities on object-oriented programs, including those written by someone else.	MAFS.912.A-REI.1.1	
	41.05 Perform test and debug activities on an event-driven program.	MAFS.912.A-REI.1.1	
	41.06 Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.	MAFS.912.A-REI.1.1	
	41.07 Document the findings of testing in a test report.	MAFS.912.S-CP.1.4	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Java Programming Essentials**
Course Number: **9007240**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to the Java programming language.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
42.0	Construct statements that declare, initialize, and modify different types of variables used in Java programs. – The student will be able to:		
42.01	Describe how variables are used in programs.		
42.02	Identify the eight Java primitive data types.		
42.03	Identify the minimum and maximum ranges of primitive data types.		
42.04	Identify which data type should be used for a given situation.		
42.05	Identify the syntax for using variables.		
42.06	Declare and initialize variables.		
42.07	Assign new values to variables.		
42.08	Create and use constant variables.		
43.0	Describe the types and characteristics of lexical units in the Java programming language. – The student will be able to:		
43.01	Describe the types of lexical units.		
43.02	Describe identifiers and identify valid and invalid identifiers.		
43.03	Describe and identify reserved words, delimiters, literals, and comments.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
44.0	Describe the data types employed in Java programs. – The student will be able to:		
44.01	Describe the data type categories.		
44.02	Give examples of primitives, reference data types.		
44.03	Identify and use enumerations.		
44.04	Understand the use of Wrapper Classes in programs.		
44.05	Describe the difference between real and integer data types.		
45.0	Construct Java statements that employ the use of various operators. – The student will be able to:		
45.01	Construct statements using arithmetic operators.		
45.02	Construct statements using relational operators.		
45.03	Construct and use statements using logical operators.		
45.04	Construct and use statements using assignment operators.		
45.05	Construct and execute statements using operator precedence.		
46.0	Write executable statements using Java. – The student will be able to:		
46.01	Construct variable assignment statements.		
46.02	Construct statements using built-in Math functions.		
46.03	Differentiate between implicit and explicit data type conversions.		
46.04	Describe when implicit data type conversions take place.		
46.05	List the drawbacks of implicit data type conversions.		
46.06	Describe the process of autoboxing and promotion.		
46.07	Construct statements using functions to explicitly convert data types.		
47.0	Describe variable scope and its implications in Java programming. – The student will be able to:		
47.01	Understand the scope and visibility of variables.		
47.02	Write programs using local variables.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	47.03 Describe the scope of a variable.		
	47.04 Describe the default value of local, instance, and static scope of variables.		
	47.05 Describe how compiler uses scope to identify variables with the same name.		
48.0	Apply common Java programming style guidelines and conventions. – The student will be able to:		
	48.01 List examples of good programming practices.		
	48.02 Insert comments into code.		
	48.03 Follow formatting guidelines when writing code.		
	48.04 Understand the different types of errors produced by programs.		
49.0	Demonstrate use of the compiler and interpreter through command line interface. – The student will be able to:		
	49.01 Describe the use of the Java compiler (javac) and Java interpreter (Java VM).		
	49.02 Demonstrate the use of the - classpath flag and –d flag to the compiler.		
	49.03 Identify the environmental variables of PATH and CLASSPATH.		
	49.04 Describe the process of command line arguments to the program.		
	49.05 Create programs that take in multiple command line arguments.		
50.0	Construct conditional control statements in Java. – The student will be able to:		
	50.01 Construct and use an if statement.		
	50.02 Construct and use a switch statement.		
	50.03 Construct and use a while, do while, and for loop.		
	50.04 Construct and use a conditional operator.		
51.0	Construct iterative control statements in Java. – The student will be able to:		
	51.01 Describe the types of loop statements and their uses.		
	51.02 Construct and use the while and do while loop.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
51.03 Construct and use the for loop.		
51.04 Construct and use the enhanced for loop.		
51.05 Describe when a while loop is used.		
51.06 Describe when a for loop is used.		
52.0 Use nested loop iterative control statements in Java. – The student will be able to:		
52.01 Construct and execute a program using nested loops.		
52.02 Construct and execute a loop using break and continue.		
52.03 Evaluate a nested loop construct and sentinel value.		
53.0 Produce input and output for Java programs. – The student will be able to:		
53.01 Describe and use classes (e.g., Scanner, System) to input data into programs.		
53.02 Demonstrate the use of different ways to input data into programs using Scanner or System class.		
53.03 Describe and demonstrate the use of the System class to produce output to the console.		
53.04 Explain the difference between print and println functions in the System class.		
53.05 Create and use escape sequences.		
54.0 Use packages and import statements in a Java program. – The student will be able to:		
54.01 Describe the use of import statements.		
54.02 Describe the use of packages.		
54.03 Create code that uses package statements to avoid class conflict.		
54.04 Create packages that abide by standard Java naming convention.		
54.05 Demonstrate the use of Java-API to search for classes and packages.		
55.0 Create a Java program that uses methods. – The student will be able to:		
55.01 Differentiate between anonymous blocks and methods.		
55.02 Identify the benefits of using methods.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
55.03 Describe a method signature.		
55.04 Create a method.		
55.05 Describe how a method is invoked.		
55.06 Describe the purpose of overloading methods.		
55.07 Create overloaded methods in programs.		
56.0 Create a Java program that uses parameters in methods. – The student will be able to:		
56.01 Describe how parameters are passed into functions.		
56.02 Define a parameter.		
56.03 Create a method using a parameter.		
56.04 Invoke a method that has parameters.		
56.05 Distinguish between formal and actual parameters.		
56.06 Demonstrate the use of reference parameters in methods.		
57.0 Describe and use recursion in a Java program. – The student will be able to:		
57.01 Describe the use of recursion in solving problems.		
57.02 Describe the difference of iterative and recursive methods.		
57.03 Demonstrate the use of direct recursion.		
57.04 Demonstrate the use of indirect recursion.		
58.0 Construct Java statements that use the String class to manipulate String data. – The student will be able to:		
58.01 Explain the use of the String class.		
58.02 Create code to concatenate strings using the concatenation operator.		
58.03 Demonstrate how to search a string using indexOf method of the String class.		
58.04 Explain the effect of immutability of Strings.		
58.05 Create Strings using string literals, and through new keyword.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
58.06 Demonstrate the use of the following string manipulation methods of the String class: charAt,length ,trim, substring, replace,startsWidth and endsWith.		

Florida Department of Education
Student Performance Standards

Course Title: **Applied Object-Oriented Java Programming**
Course Number: **9007250**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to the Java programming language.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
59.0 Construct Java statements that use Classes. – The student will be able to:		
59.01 Describe and identify abstract data types.		
59.02 Describe the difference between an object and a class.		
59.03 Identify class attributes.		
59.04 Create instance variables for a class.		
59.05 Use visibility modifiers for attributes.		
59.06 Identify constructors and describe their use.		
59.07 Describe encapsulation.		
59.08 Write class using encapsulation.		
59.09 Apply data abstraction through the use of accessor or and mutator methods.		
59.10 Describe the equals method.		
59.11 Demonstrate the use of classes in methods as both parameters and return types.		
59.12 Describe the garbage collection process.		
59.13 Demonstrate reusability and extensibility in class creation.		
59.14 Demonstrate the use of Comparable interface to compare objects.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
60.0	Manage class relationships. – The student will be able to:		
60.01	Explain the association relationship among classes.		
60.02	Explain the direct association relationship among classes.		
60.03	Explain the composition and aggregation relationship among classes.		
60.04	Explain the direct association relationship among classes.		
60.05	Write programs that use composition, association.		
60.06	Write programs that use direct association.		
61.0	Construct Java statements that illustrate the use of multiplicities in class relationships. – The student will be able to:		
61.01	Describe how multiplicities affect class relationships.		
61.02	Describe one-to one, one-to-many, and many-to-many relationships.		
61.03	Write programs that use multiplicities in class relationships.		
62.0	Use object references – The student will be able to:		
62.01	Identify reference aliases.		
62.02	Understand and use null reference.		
62.03	Explain the this reference and its use in class creation.		
63.0	Describe the types of arrays and construct Java statements that illustrate the use and manipulation of multi-dimensional and jagged arrays. – The student will be able to:		
63.01	Declare and initialize and array.		
63.02	Demonstrate the use of initializer lists.		
63.03	Demonstrate the use of arrays in methods.		
63.04	Demonstrate the updating, populating and destroying arrays.		
63.05	Explain linear and binary searching.		
63.06	Sort arrays using selection sort, insertion sort, and bubble sort.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	63.07 Demonstrate the use of multidimensional arrays.		
	63.08 Demonstrate the use of jagged arrays.		
	63.09 Demonstrate basic hashing using arrays.		
64.0	Construct Java statements that illustrate different ways of using inheritance. – The student will be able to:		
	64.01 Explain the purpose and use of inheritance in object oriented programming.		
	64.02 Explain the difference between single and multiple inheritance.		
	64.03 Create parent and child classes.		
	64.04 Create overloaded methods.		
	64.05 Describe the has-a and is-a relationship.		
	64.06 Create class hierarchies.		
	64.07 Explain the process of generalization to specification.		
	64.08 Demonstrate the use of abstract classes.		
	64.09 Explain polymorphism.		
	64.10 Create a program that uses polymorphism.		
	64.11 Demonstrate the use of the instance of method.		
65.0	Construct Java statements that use collections. – The student will be able to:		
	65.01 Describe data structure of linked lists.		
	65.02 Create a linked list manually.		
	65.03 Use the ArrayList class.		
	65.04 Create a stack and Queue manually.		
	65.05 Use the Stack and Queue standard class.		
	65.06 Identify which data structure is best fitted for a situation.		
	65.07 Use iterators with collections.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
65.08 Identify how to insert, delete, update, and traverse data structures.		
66.0 Write Java code that uses the Iterator and List interfaces. – The student will be able to:		
66.01 Describe the purpose of interfaces.		
66.02 Create and use interfaces in programs.		
66.03 Use the Comparable interface.		
66.04 Use the Iterator interface and List Interface in programs.		
66.05 Understand the program to the interface principle.		
67.0 Create Java code that includes exception handling code. – The student will be able to:		
67.01 Describe the advantages of including exception handling code.		
67.02 Describe the purpose of an EXCEPTION section in a program block.		
67.03 Create code to include an EXCEPTION section.		
67.04 List the guidelines for exception handling.		
68.0 Create Java code that uses the Object class. – The student will be able to:		
68.01 Understand the Object class relationship to other classes.		
68.02 Demonstrate the use of toString method.		
68.03 Demonstrate the use of clone and finalize methods.		
68.04 Write program to use Object class functionality.		
69.0 Use standard library classes that comprise the Java API. – The student will be able to:		
69.01 Describe the classes and methods in the basic input/output package.		
69.02 Describe the classes and methods in the utilities package.		
69.03 Describe the classes and methods in the networking package.		
69.04 Describe the classes and methods in the AWT and swing package.		
69.05 Describe the classes and methods in the SQL and SQLX package.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
70.0	Create Java code that uses exceptions to improve program quality. – The student will be able to:		
70.01	Explain how exception handling works in Java.		
70.02	Trap exceptions using try and catch.		
70.03	Explain when to use the finally clause.		
70.04	Demonstrate handling exceptions through throwing and catching.		
70.05	Create and Exception and manage the exception.		
70.06	Explain the use of inheritance and exceptions.		

Florida Department of Education
Student Performance Standards

Course Title: **Java Database Programming**
Course Number: **9007260**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to the Java programming language.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
71.0	Describe Java 2 Micro Edition (J2ME) uses, characteristics, and constraints. – The student will be able to:		
71.01	Understand midlets.		
71.02	Explain CLDC and profiles.		
71.03	Explain the constraints specific to J2ME programming when compared to J2SE.		
71.04	Understand the high architectural goal of J2ME.		
71.05	Create user-defined functions.		
72.0	Create and convert classes using Unified Modeling Language (UML). – The student will be able to:		
72.01	Identify UML elements Classes, abstract Classes, Interfaces.		
72.02	Identify UML attributes, operators, visibility modifiers and UML associations.		
72.03	Given a set of classes be able to convert the classes to a UML diagram.		
72.04	Given a UML diagram be able to create classes.		
73.0	Create programs that use of Remote Method Invocation (RMI) and other server technologies associated with Relational Database Management Systems (RDMS) and Structured Query Language (SQL). – The student will be able to:		
73.01	Understand and describe RMI.		
73.02	Write a program to use RMI.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	73.03 Understand RDMS and SQL technologies.		
	73.04 Use the Java Database Connectivity API to connect and execute SQL statements to RDMS.		
74.0	Demonstrate an understanding of Java Integration APIs, including Java Message Service (JMS), Enterprise JavaBeans (EJB), and Java Naming and Directory Interface (JNDI). – The student will be able to:		
	74.01 Understand and describe JMS.		
	74.02 Understand and describe EJB technology.		
	74.03 Understand and describe JNDI technology.		
75.0	Demonstrate an understanding of Java Client APIs, including the Abstract Window Toolkit (AWT), Swing, and Java applet. – The student will be able to:		
	75.01 Understand and describe AWT and GUI interface.		
	75.02 Understand and describe the use of Swing components and GUI.		
	75.03 Understand and describe the use of applet technology.		
76.0	Understand and apply Java 2 Enterprise Edition (J2EE) Server Solutions. – The student will be able to:		
	76.01 Understand java Web Services.		
	76.02 Underrated and use SMTP and Java Mail technologies.		
	76.03 Understand how to use JSP and Servlets.		
77.0	Create a database application using the Java programming language. – The student will be able to:		
	77.01 Utilize loop statements.		
	77.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.		
	77.03 Create user-defined functions.		
	77.04 Utilize common built-in functions.		
	77.05 Declare variables in modules and procedures.		
	77.06 Declare arrays, and initialize elements of arrays.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	77.07 Declare and use object variables and collections, and use their associated properties and methods.		
	77.08 Declare symbolic constants, and make them available locally or publicly.		
	77.09 Respond to events.		
78.0	Create a graphical user interface application using the Java programming language. – The student will be able to:		
	78.01 Utilize loop statements.		
	78.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.		
	78.03 Create user-defined functions.		
	78.04 Utilize common built-in functions.		
	78.05 Declare variables in modules and procedures.		
	78.06 Declare arrays, and initialize elements of arrays.		
	78.07 Declare and use object variables and collections, and use their associated properties and methods.		
	78.08 Declare symbolic constants, and make them available locally or publicly.		
	78.09 Use the Java Event model to handle user inputs from events.		
	78.10 Use JComponents and layout managers to create the GUI.		
79.0	Create a web-based application using the Java programming language. – The student will be able to:		
	79.01 Utilize loop statements.		
	79.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.		
	79.03 Create user-defined functions.		
	79.04 Utilize common built-in functions.		
	79.05 Declare variables in modules and procedures.		
	79.06 Declare arrays, and initialize elements of arrays.		
	79.07 Declare and use object variables and collections, and use their associated properties and methods.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	79.08 Declare symbolic constants, and make them available locally or publicly.		
	79.09 Write JSP pages to process user input.		
	79.10 Write Servlets to provide input and output processing for the web solution.		
80.0	Write code to perform common and union database queries using SQL and Java. – The student will be able to:		
	80.01 Utilize SQL to write common queries.		
	80.02 Refer to objects by using SQL.		
	80.03 Utilize union queries.		
81.0	Implement Java program statements using objects. – The student will be able to:		
	81.01 Determine when to use data access objects.		
	81.02 Differentiate between objects and collections.		
	81.03 Write statements that access and modify database objects, EJB objects.		
	81.04 Select appropriate methods and property settings for use with specified objects.		
82.0	Utilize debugging tools and write error handlers. – The student will be able to:		
	82.01 Trap errors.		
	82.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.		
	82.03 Debug code samples.		
	82.04 Utilize the Debugger to monitor variable values.		
	82.05 Write an error handler.		
83.0	Demonstrate file input/output (I/O). – The student will be able to:		
	83.01 Read from sequential and random access files.		
	83.02 Write to sequential and random access files.		
	83.03 Use file serialization.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
84.0 Utilize API functions. – The student will be able to:		
84.01 Properly declare functions.		
84.02 Use the by value and by reference parameters.		
85.0 Test and debug databases. – The student will be able to:		
85.01 Implement error handling.		
85.02 Test and debug library databases.		

Florida Department of Education
Student Performance Standards

Course Title: **Java Programming Capstone**
Course Number: **9007270**
Course Credit: **1**

Course Description:

This course serves as the capstone course, providing students with the opportunity to apply acquired computer programming knowledge and skills specific to the Java programming language. The range of competencies students will be expected to demonstrate include project planning, design, documentation, Java programming, and reporting/presenting the results of the project. Each student will be expected to maintain a portfolio of the project and give a presentation of the completed work at the end of the course.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
86.0	Successfully work as a member of a software development team. – The student will be able to:		
86.01	Accept responsibility for specific tasks in a given situation.		
86.02	Document progress, and provide feedback on work accomplished in a timely manner.		
86.03	Complete assigned tasks in a timely and professional manner.		
86.04	Reassign responsibilities when the need arises.		
86.05	Complete daily tasks as assigned on one's own initiative.		
87.0	Manage time according to a plan. – The student will be able to:		
87.01	Set realistic time frames and schedules.		
87.02	Keep a written time sheet of work accomplished on a daily basis.		
87.03	Meet goals and objectives set by the team.		
87.04	Identify individual priorities.		
87.05	Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities as needed.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
88.0	Keep acceptable records of progress problems and solutions. – The student will be able to:		
88.01	Develop a record keeping system in the form of a log book to record daily progress.		
88.02	Use a project journal to identify problem statement.		
88.03	Develop a portfolio of work accomplished to include design drawings, flowcharts, drawings and plans, and prototypes.		
89.0	Plan, organize, and carry out a project plan. – The student will be able to:		
89.01	Determine the scope of a project.		
89.02	Organize the team according to individual strengths.		
89.03	Assign specific tasks within a team.		
89.04	Determine project priorities.		
89.05	Identify required resources.		
89.06	Plan research, design, development, and evaluation activities as required.		
89.07	Carry out the project plan to successful completion.		
90.0	Manage resources. – The student will be able to:		
90.01	Identify required resources for each stage of the project plan.		
90.02	Determine the methods needed to acquire needed resources.		
90.03	Demonstrate good judgment in the use of resources.		
90.04	Recycle and reuse resources where appropriate.		
90.05	Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.		
91.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:		
91.01	Identify the proper tool for a given job.		
91.02	Use tools and machines in a safe manner.		
91.03	Adhere to laboratory or job site safety rules and procedures.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	91.04 Identify the application of processes appropriate to the task at hand.		
	91.05 Identify materials appropriate to their application.		
92.0	Demonstrate an understanding of the software development process. – The student will be able to:		
	92.01 State the goals of the software application clearly.		
	92.02 Identify and write a plan to achieve each goal.		
	92.03 Develop a list of materials and content required for each goal.		
	92.04 Develop a step by step procedure for developing the application.		
	92.05 Follow a written procedure.		
	92.06 Record data from evaluation activities.		
	92.07 Document conclusions and solutions based on evaluation results, observations and data.		
	92.08 Document progress using a project log.		
	92.09 Write an abstract describing the project plan.		
93.0	Research content related to the project and document the results following industry conventions. – The student will be able to:		
	93.01 Identify the basic research needed to develop the project plan.		
	93.02 Identify available resources for completing background research required in the project plan.		
	93.03 Demonstrate the ability to locate resource materials in a library, data base, internet and other research resources.		
	93.04 Demonstrate the ability to organize information retrieval.		
	93.05 Demonstrate the ability to prepare a topic outline.		
	93.06 Write a draft of the research report.		
	93.07 Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.		
	93.08 Prepare an electronically composed research paper in proper form.		
	93.09 Conduct an alpha and beta evaluation of the project's product.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	93.10 Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.		
94.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:		
	94.01 Prepare a multi-media presentation on the completed project.		
	94.02 Make an oral presentation, using multi-media materials.		
	94.03 Review the presentation, and make changes in the delivery method(s) to improve presentation skills.		
95.0	Demonstrate competency in the area of expertise related to developing computer software using the Java programming language. – The student will be able to:		
	95.01 Demonstrate a mastery of the content of the selected subject area.		
	95.02 Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.		
	95.03 Demonstrate the ability to apply the knowledge, experience and skill developed in the previous program completion to the successful completion of this demonstration.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Database Application Development & Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9007300
CIP Number	0511020315
Grade Level	9-12, 30, 31
Standard Length	8 credits
Teacher Certification	BUS ED 1 @2 COMP SCI 6 COMP PROG 7 G
CTSO	FBLA BPA SkillsUSA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the fundamentals of programming and software development; procedural and object-oriented programming; creating regular and specialized applications using standard and extended Structured Query Language (SQL), including testing, monitoring, debugging, documenting, and maintaining database applications.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points, with OCPs A, B, and C comprising the Software Development Core.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	9007210	Foundations of Programming	1 credit	15-1131	3	VO
	9007220	Procedural Programming	1 credit		3	
C	9007230	Object-Oriented Programming Fundamentals	1 credit	15-1131	3	VO
D	9007310	Database Design & SQL Programming	1 credit	15-1131	3	VO
	9007320	SQL Extension Languages I	1 credit		3	
	9007330	SQL Extension Languages II	1 credit		3	
	9007340	Custom Database Programming	1 credit		3	

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Some or all of the courses in this program have been academically aligned to the Florida Standards for Mathematics and the Next Generation Sunshine State Standards (NGSSS) for Science. The table below contains the results of the alignment efforts by both academic core and Career and Technical Education (CTE) professional educators. Data shown in the table includes the number of academic standards in the CTE course and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9007210	2/87 2%	7/80 9%	22/83 27%	4/69 6%	23/67 34%	4/70 6%	3/69 4%	23/82 28%	6/66 9%	26/74 35%	4/72 6%
9007220	21/87 24%	21/80 26%	2/83 2%	21/69 30%	2/67 3%	20/70 29%	21/69 30%	2/82 2%	16/66 24%	2/74 3%	21/72 30%
9007230	20/87 23%	20/80 25%	1/83 1%	20/69 29%	1/67 1%	20/70 29%	20/69 29%	1/82 1%	15/66 23%	1/74 1%	21/72 28%
9007310	1/87 1%	1/80 1%	1/83 1%	1/69 1%	1/67 1%	0/70 0%	1/69 1%	1/82 1%	1/66 2%	1/74 1%	1/72 1%
9007320	#	#	#	#	#	#	#	#	#	#	#

9007330	#	#	#	#	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8027310	20/67 30%	15/75 20%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	40/45 89%
9007210	11/67 16%	10/75 13%	10/54 19%	#	#	#	#
9007220	14/67 21%	10/75 13%	11/54 20%	#	#	#	#
9007230	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
9007310	3/67 4%	4/75 5%	#	#	#	#	#
9007320	#	#	#	#	#	#	#
9007330	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and

teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Database Application Development & Programming.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Database Application Development & Programming.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Database Application Development & Programming.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
19.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
20.0 Distinguish between iterative and non-iterative program control structures.
21.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
22.0 Describe the processes, methods, and conventions for software development and maintenance.
23.0 Explain the types, uses, and limitations of testing for ensuring quality control.
24.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
25.0 Describe information security risks, threats, and strategies associated with software development.
26.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
27.0 Solve problems using critical thinking skills, creativity and innovation.
28.0 Use information technology tools.

29.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database Application Development & Programming.
30.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Database Application Development & Programming.
31.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Database Application Development & Programming.
32.0 Design a computer program to meet specific physical, operational, and interaction criteria.
33.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
34.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
35.0 Create a unit test plan, implement the plan, and report the results of testing.
36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
37.0 Describe the importance of professional ethics and legal responsibilities.
38.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
39.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
40.0 Design, document, and create object-oriented computer programs.
41.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
42.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
43.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
44.0 Develop the process of creating an entity by identifying relationships.
45.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
46.0 Consider the degree and optionality of relationships of entities.
47.0 Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams.
48.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
49.0 Demonstrate proficiency in designing and adding complexity to an entity-relationship model (ERM).
50.0 Apply complex ERM information by fine-tuning entities and the process for relating them.
51.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
52.0 Demonstrate proficiency in the technique of normalization by labeling and organizing all items in a database in such a way as to prevent any confusion or mistakes.
53.0 Demonstrate proficiency in table normalization by combining the techniques of an entity relationship model or a top-down, business approach to data with normalization or a bottom-up mathematical approach to data.
54.0 Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database.
55.0 Extend the logical model presentation model by normalizing the data and mapping the management system.
56.0 Apply techniques for building a storage management system by creating a website using templates and wizards.
57.0 Demonstrate design and functionality by constructing a group business presentation.
58.0 Demonstrate comprehension of database modeling competency through group presentation.
59.0 Demonstrate comprehension that the database management software is a system for organizing the storage unit (or database) according to business needs and rules, through data integrity constraints.
60.0 Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements.
61.0 Demonstrate proficiency working with columns, characters, and rows in SQL.
62.0 Demonstrate proficiency in using SQL comparison operators.

63.0 Demonstrate proficiency in using logical comparisons and precedence rules.
64.0 Demonstrate proficiency using SQL single row functions.
65.0 Demonstrate proficiency displaying data from multiple tables.
66.0 Demonstrate proficiency aggregating data using group functions.
67.0 Demonstrate proficiency utilizing subqueries.
68.0 Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language.
69.0 Demonstrate proficiency creating and managing database objects.
70.0 Demonstrate proficiency altering tables and constraints implementing views.
71.0 Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects.
72.0 Demonstrate ability to control user access and SQL language interface and reporting tool.
73.0 Demonstrate comprehension of bundling features of SQL.
74.0 Demonstrate comprehension working with composite data types by writing executable script files.
75.0 Describe the differences between SQL and SQL extension languages.
76.0 Create program blocks.
77.0 Use variables in program blocks.
78.0 Recognize lexical units.
79.0 Recognize data types.
80.0 Use scalar data types.
81.0 Use various types of joins.
82.0 Use SQL group functions and subqueries.
83.0 Write executable statements.
84.0 Use nested blocks and variable scope.
85.0 Use good programming practices.
86.0 Write DML statements to manipulate data.
87.0 Retrieve data.
88.0 Manipulate data.
89.0 Use transaction control statements.
90.0 Use IF conditional control statements.
91.0 Use CASE conditional control statements.
92.0 Use basic LOOP iterative control statements.
93.0 Use WHILE and FOR loop iterative control statements.
94.0 Use nested loop iterative control statements.
95.0 Use explicit cursors.
96.0 Use explicit cursor attributes.
97.0 Use cursor FOR loops.
98.0 Use cursors with parameters.
99.0 Use cursors for update transactions.
100.0 Use multiple cursors.
101.0 Handle exceptions.
102.0 Trap server exceptions.
103.0 Trap user-defined exceptions.
104.0 Create procedures.

105.0 Use parameters in procedures.
106.0 Pass parameters.
107.0 Create stored functions.
108.0 Use functions in SQL statements.
109.0 Manage procedures and functions.
110.0 Manage object privileges.
111.0 Use invoker’s rights.
112.0 Create packages.
113.0 Manage package constructs.
114.0 Use advanced package concepts.
115.0 Manage persistent state of package variables.
116.0 Use vendor-supplied packages.
117.0 Understand dynamic SQL.
118.0 Understand triggers.
119.0 Create DML triggers.
120.0 Create DDL and database event triggers.
121.0 Manage triggers.
122.0 Use large object data types.
123.0 Manage binary types.
124.0 Manage indexes.
125.0 Manage dependencies.
126.0 Program a database application.
127.0 Utilize the basic concepts of database design.
128.0 Utilize SQL and union queries.
129.0 Implement program statements using objects.
130.0 Utilize debugging tools and write error handlers.
131.0 Demonstrate file I/O.
132.0 Create forms and identify all the properties of a form.
133.0 Manipulate data using object models.
134.0 Develop custom controls.
135.0 Utilize API functions.
136.0 Demonstrate database replication and implement database replication using programming tools.
137.0 Analyze and implement security options.
138.0 Implement client/server applications.
139.0 Optimize the performance of a database.
140.0 Perform application distribution.
141.0 Test and debug databases.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Foundations of Programming**
Course Number: **9007210**
Course Credit: **1**

Course Description:

This course introduces concepts, techniques, and processes associated with computer programming and software development. After successful completion of Programming Foundations and Procedural Programming, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Database Application Development & Programming.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Database Application Development & Programming.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards			Correlation to CTE Program Standard #
		capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Database Application Development & Programming..	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:		
18.01 Describe the evolution of programming and programming careers.	MAFS.912.A-REI.1.1	
18.02 Identify tasks performed by programmers.	MAFS.912.N-Q.1.1	
18.03 Describe how businesses use computer programming to solve business problems.	MAFS.912.A-REI.1.1	
18.04 Investigate job opportunities in the programming field.		
18.05 Explain different specializations and the related training in the computer programming field.	MAFS.912.A-REI.1.1 MAFS.912.G-SRT.1.2	
18.06 Explain the need for continuing education and training of computer programmers.	MAFS.912.A-REI.1.1	
18.07 Explain enterprise software systems and how they impact business.	MAFS.912.A-REI.1.1	
18.08 Describe ethical responsibilities of computer programmers.	MAFS.912.A-REI.1.1	
18.09 Describe the role of customer support to software program quality.	MAFS.912.A-REI.1.1	
18.10 Identify credentials and certifications that may improve employability for a computer programmer.	MAFS.912.N-Q.1.1	
18.11 Identify devices, tools, and other environments for which programmers may develop software.	MAFS.912.G-CO.4.12; MAFS.912.N-Q.1.1	
19.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:		
19.01 Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.	MAFS.912.N-Q.1.2	
19.02 Explain the types and uses of variables in programs.	MAFS.912.A-REI.1.1; MAFS.912.A-SSE.1.1	
19.03 Determine the best data type to use for given programming problems.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.04	Identify the types of operations that can be performed on different data types.	MAFS.912.N-Q.1.1	
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
19.06	Explain how computers store different data types in memory.	MAFS.912.A-REI.1.1	
19.07	Demonstrate the difference between "data" and "information".		
19.08	Use different number systems to represent data.	MAFS.912.N-Q.1.1	
19.09	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.	MAFS.912.A-REI.1.1	
19.10	Use Boolean logic to perform logical operations.		
20.0	Distinguish between iterative and non-iterative program control structures–The student will be able to:		
20.01	Explain non-iterative programming structures (*e.g.*, if, if/else and their uses.	MAFS.912.A-REI.1.1	
20.02	Explain iterative programming structures (*e.g.*, while, do/while) and their uses.	MAFS.912.A-REI.1.1	
21.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:		
21.01	Identify the characteristics, uses, and limits of low-level programming languages.	MAFS.912.N-Q.1.1	
21.02	Identify the characteristics, uses, and limits of high-level programming languages.	MAFS.912.N-Q.1.1	
21.03	Identify the characteristics, uses, and limits of rapid development programming languages.	MAFS.912.N-Q.1.1	
21.04	Describe object-oriented concepts.	MAFS.912.A-REI.1.1	
21.05	Explain the characteristics of procedural and object-oriented programming languages.	MAFS.912.A-REI.1.1	
21.06	Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).	MAFS.912.G-SRT.1.2	
22.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:		
22.01	Describe and explain tools used in software development.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	
22.02	Describe the stages of the program life cycle.	MAFS.912.A-REI.1.1	
22.03	Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).	MAFS.912.G-SRT.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
22.04	List and explain the steps in the program development cycle.	MAFS.912.A-REI.1.1	
22.05	Describe different types of documentation used in the program development cycle (*e.g.*, requirements document, program design documents, test plans).	MAFS.912.N-Q.1.1	
22.06	Describe the on-going need for program maintenance.	MAFS.912.A-REI.1.1	
22.07	Describe different methods companies use to facilitate program updates for enhancements and defects (*e.g.*, how customers receive patches, updates, new versions, upgrades).	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
22.08	Describe different methods used to facilitate version control and change management.	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
23.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:		
23.01	Explain the uses and limits of testing in ensuring program quality.	MAFS.912.A-REI.1.1	SC.912.N.1.1
23.02	Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.1	
23.03	Describe data and the use of test plans/scripts to be used in program testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
23.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
23.05	Identify the data to be used for boundary conditions.	MAFS.912.N-Q.1.1	
23.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	SC.912.N.1.1
24.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:		
24.01	Describe different design methodologies and their uses (*e.g.*, object-oriented design, structured design, and rapid application development).	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.3.5
24.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).	MAFS.912.A-REI.1.1	SC.912.N.1.1
24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.	MAFS.912.A-REI.1.1	
24.04	Participate and contribute to a design review of a program design developed using a common program design tool (*e.g.*, UML, flowcharts, design documents, pseudocode).	MAFS.912.A-CED.1.1	SC.912.N.1.1, SC.912.N.1.3, SC.912.N.2.4, SC.912.N.4.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	24.05 Write a program design document using UML or other standard design methodology.	MAFS.912.A-CED.1.1	
	24.06 Define input and output for a program module using UML or other standard design methodology.	MAFS.912.F-IF.1.1	
25.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:		
	25.01 Explain the security risks to personal and business computer users.	MAFS.912.S-IC.2.6	
	25.02 Identify different types of threats to computer systems.	MAFS.912.N-Q.1.1	
	25.03 Identify methods to protect against different threats to computer systems.	MAFS.912.N-Q.1.1	
	25.04 Understand the importance of a disaster/emergency response plan.		
	25.05 Identify alternative methods for data storage and backup (*e.g.*, mirroring, fail-over, high availability, types of backups).	MAFS.912.N-Q.1.1	
26.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
	26.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		SC.912.N.1.9, SC.912.N.1.10
	26.02 Locate, organize and reference written information from various sources.		SC.912.N.1.1.6
	26.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	MAFS.912.A-CED.1.1	SC.912.N.1.1.9, SC.912.N.1.1.10
	26.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.	MAFS.912.G-SRT.1.2	SC.912.N.1.1.5, SC.912.N.1.1.6, SC.912.N.1.1.8
	26.05 Apply active listening skills to obtain and clarify information.		
	26.06 Develop and interpret tables and charts to support written and oral communications.	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.1 MAFS.912.F-IF.3.9	SC.912.N.1.1.6-11
	26.07 Exhibit public relations skills that aid in achieving customer satisfaction.		
27.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	27.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	MAFS.912.G-CO.3.9	SC.912.N.1.1
	27.02 Employ critical thinking and interpersonal skills to resolve conflicts.	MAFS.912.G-CO.3.9	SC.912.N.1.3, SC.912.N.4.1
	27.03 Identify and document workplace performance goals and monitor progress toward	MAFS.912.N-Q.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	those goals.		
27.04	Conduct technical research to gather information necessary for decision-making.	MAFS.912.S-IC.2.6; MAFS.912.S-IC.1.1	SC.912.N.1.3, SC.912.N.1.1.5
28.0	Use information technology tools. – The student will be able to:		
28.01	Use personal information management (PIM) applications to increase workplace efficiency.		
28.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.	MAFS.912.G-CO.4.12	
28.03	Employ computer operations applications to access, create, manage, integrate, and store information.	MAFS.912.Z-CED.1.1	
28.04	Employ collaborative/groupware applications to facilitate group work.		

Florida Department of Education
Student Performance Standards

Course Title: **Procedural Programming**
Course Number: **9007220**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts with a focus on the creation of software applications employing procedural programming techniques. After successful completion of Programming Foundations and Procedural Programming, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database Application Development & Programming.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Database Application Development & Programming.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Database Application Development & Programming.		
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.0 Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:		
32.01 Choose appropriate data types depending on the needs of the program.	MAFS.912.N-Q.1.1	
32.02 Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).	MAFS.912.N-Q.1.2	
32.03 Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).	MAFS.912.A-REI.1.1	
32.04 Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).	MAFS.912.N-Q.1.1	
32.05 Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).	MAFS.912.N-Q.1.1	
33.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:		
33.01 Use appropriate naming conventions to define program variables and modules (methods, functions).	MAFS.912.N-Q.1.1	
33.02 Use a program editor to write the source code for a program.	MAFS.912.A-REI.1.1	
33.03 Write programs that use selection structures (*e.g.*, if, if/else).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.04 Write programs that use repetition structures (*e.g.*, while, do/while).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.05 Write programs that use nested structures.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.06 Use internal documentation (*e.g.*, single-line and multi-line comments, program headers, module descriptions, meaningful variable and function/module names) to		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	document a program according to accepted standards.		
33.07	Compile and run programs.	MAFS.912.A-REI.1.1	
33.08	Write programs that use standard arithmetic operators with different numerical data types.	MAFS.912.N-Q.1.1; MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2 MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
33.09	Write programs that use standard logic operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.10	Write programs that use a variety of common data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2 MAFS.912.N-Q.1.1, MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
33.11	Write programs that perform data conversion between standard data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.12	Write programs that define, use, search, and sort arrays.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.13	Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.14	Demonstrate understanding and use of appropriate variable scope.	MAFS.912.A-REI.1.1	
34.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:		
34.01	Write programs that perform user input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).	MAFS.912.A-CED.1.1;	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		MAFS.912.A-CED.1.2	
	34.03 Write program modules such as functions, subroutines, or methods.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.04 Write program modules that accept arguments.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.05 Write program modules that return values.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.06 Write program modules that validate arguments and return error codes.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.07 Write interactive programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.08 Write programs that use standard libraries to enhance program function.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.		
35.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:		
	35.01 Write a unit test plan that identifies the input data and expected results for program tests.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	35.02 Test and debug programs, including programs written by others.	MAFS.912.A-REI.1.1	
	35.03 Write a test report that identifies the results of testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	35.04 Trace through the function of a program to ensure valid operation.	MAFS.912.N-Q.1.1	
	35.05 Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).	MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.2	
	35.06 Create a disaster/emergency response plan for a computer system.	MAFS.912.A-CED.1.1; MAFS.912.A-	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		CED.1.2	
36.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
36.01	Employ leadership skills to accomplish organizational goals and objectives.		
36.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
36.03	Conduct and participate in meetings to accomplish work tasks.		
37.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
37.01	Evaluate and justify decisions based on ethical reasoning.	MAFS.912.S-IC.2.6	
37.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	MAFS.912.S-IC.2.6	
37.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	MAFS.912.S-IC.2.6; MAFS.912.A-REI.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Object-Oriented Programming Fundamentals**
Course Number: **9007230**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts with a focus on the creation of software applications employing object-oriented programming techniques. After successful completion of Object-Oriented Programming, students will have met Occupational Completion Point C, Computer Programmer, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database Application Development & Programming.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Database Application Development & Programming.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Database Application Development & Programming.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
38.0 Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:		
38.01 Demonstrate the understanding and use of classes, objects, attributes, and behaviors.	MAFS.912.A-REI.1.1	
38.02 Demonstrate the understanding and use of inheritance.	MAFS.912.A-REI.1.1	
38.03 Demonstrate the understanding and use of data encapsulation.	MAFS.912.A-REI.1.1	
38.04 Demonstrate the understanding and use of polymorphism.	MAFS.912.A-REI.1.1	
39.0 Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements. – The student will be able to:		
39.01 Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.	MAFS.912.A-REI.1.1	
39.02 Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.	MAFS.912.A-REI.1.1	
39.03 Design an object-oriented program using UML or another standard design methodology.	MAFS.912.H-CED.1.1	
39.04 Work with other team members to develop a project plan for a program.	MAFS.912.A-REI.1.1	
39.05 Work with other team members to write a design document for a program with multiple functions and shared data.	MAFS.912.A-REI.1.1	
39.06 Participate in design meetings that review program design documents for conformance to program requirements.	MAFS.912.S.IC.2.6	
39.07 Estimate the time to develop a program or module.	MAFS.912.S.IC.2.6	
40.0 Design, document, and create object-oriented computer programs. – The student will be able to:		
40.01 Compare and contrast recursive functions to other iterative methods.	MAFS.912.G-SRT.1.2	
40.02 Understand the implementation of character strings in the programming language.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
40.03 Write programs that perform string processing (*e.g.*, string manipulation, string compares, concatenation).	MAFS.912.A-REI.1.1	
40.04 Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.05 Write object-oriented programs that use inheritance.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.06 Write object-oriented programs that use polymorphism.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.07 Develop class constructors.	MAFS.912.S-MD.1.3	
40.08 Write programs that define and use program constants.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.09 Write programs that perform error handling.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.10 Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.	MAFS.912.S-IC.2.6	
40.11 Write programs that perform dynamic memory allocation.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.12 Write programs that perform effective management of dynamically allocated memory.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.13 Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal, external) related to version control.	MAFS.912.A-REI.1.1	
40.14 Write programs that use complex data structures (*e.g.*, stacks, queues, trees, linked lists).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.15 Write programs that are event-driven.	MAFS.912.A-CED.1.1; MAFS.912.A-	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		CED.1.2	
	40.16 Write programs that perform file input and output (*i.e.*, sequential and random access file input/output).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	40.17 Perform basic database commands including connect, open, select, and close.	MAFS.912.A-REI.1.1	
41.0	Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results. – The student will be able to:		
	41.01 Develop a test plan for an object-oriented program.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.02 Write test plans for event-driven programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.03 Write test plans for programs that perform file input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.04 Perform test and debug activities on object-oriented programs, including those written by someone else.	MAFS.912.A-REI.1.1	
	41.05 Perform test and debug activities on an event-driven program.	MAFS.912.A-REI.1.1	
	41.06 Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.	MAFS.912.A-REI.1.1	
	41.07 Document the findings of testing in a test report.	MAFS.912.S-CP.1.4	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Database Design and SQL Programming**
Course Number: **9007310**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to the SQL programming language.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
42.0	Develop an awareness of the changes taking place in the information age and how they fit into an evolving society. – The student will be able to:		
42.01	Cite examples of jobs, salary, and opportunities he/she will have as a database programmer.		
42.02	Describe the role a database plays in a business.		
42.03	Understand the importance of clear communication when discussing business informational requirements.		
42.04	Identify important historical contributions in database development and design.		
43.0	Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs. – The student will be able to:		
43.01	Identify and analyze the phases of the database development process.		
43.02	Explain what logical data modeling and database design involve.		
43.03	Compare database development process with that of the application development process.		
43.04	Distinguish between a logical model and a physical implementation.		
44.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:		
44.01	Identify and model various types of entities.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	44.02 Identify naming and drawing conventions for entities.		
	44.03 Sequence the steps that are necessary for creation of an entity.		
	44.04 Analyze and model the relationships between entities.		
45.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:		
	45.01 Analyze and model attributes.		
	45.02 Identify unique identifiers for each entity.		
	45.03 Develop an entity relationship diagram tagging attributes with optionality.		
46.0	Consider the degree and optionality of relationships of entities. – The student will be able to:		
	46.01 Create entity relationship models based on information requirements and interviews.		
	46.02 Differentiate between one-to-many, many-to-many and one-to-one relationships.		
	46.03 Identify relationship between two entities by reading a given diagram.		
	46.04 Create a relationship between instances of the same entity.		
	46.05 Read an entity relationship model in order to validate it.		
47.0	Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams. – The student will be able to:		
	47.01 Identify the significance of an attribute that has more than one value for each entity instance.		
	47.02 Evaluate appropriate methods of storing validation rules for attributes.		
	47.03 Recognize unique identifiers inherited from other entities.		
	47.04 Sequence the steps involved in resolving a many-to-many relationship.		
48.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:		
	48.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).		
	48.02 Resolve many-to-many relationships with intersection entities.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	48.03 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.		
	48.04 Create exclusive entities and relationships by using subtypes and arcs, respectively.		
	48.05 Identify initial layout for presentation and generate a list of action items for members of group.		
	48.06 Develop an entity relationship model using subtypes, super-types and an exclusive arc.		
49.0	Demonstrate proficiency in designing and adding complexity to an entity-relationship model (ERM). – The student will be able to:		
	49.01 Revise an entity relationship model according to client requirements.		
	49.02 Define and give examples of hierarchical and recursive relationships.		
	49.03 Differentiate between transferable and non-transferable relationships.		
	49.04 Deliver a professional, formal business style presentation.		
	49.05 Evaluate and critique presentation layout, design and performance.		
	49.06 Construct a model using both recursion and hierarchies to express the same logical meaning.		
50.0	Apply complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:		
	50.01 Describe a relational database and how it differs from other database systems.		
	50.02 Define primary keys and foreign keys and describe their purpose.		
	50.03 Describe what data integrity refers to and list some constraints.		
	50.04 Explain how database design fits into the database development process.		
	50.05 Translate an entity-relationship model into a relational database design.		
	50.06 Document a database design using table instance charts.		
51.0	Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved. – The student will be able to:		
	51.01 Demonstrate ability to implement steps for mapping entity relationship models for implementation.		
	51.02 Document an initial database design on table instance charts.		
	51.03 Recognize raw data and evaluate the steps for creating a data group in unnormalized		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	form.		
52.0	Demonstrate proficiency in the technique of normalization by labeling and organizing all items in a database in such a way as to prevent any confusion or mistakes. – The student will be able to:		
52.01	Differentiate between unnormalized data and normalized.		
52.02	Move data from an unnormalized form through to a third normal form.		
52.03	Demonstrate ability to test data groups for third normal form compliance.		
52.04	Identify optimized data groups from given groups of normalized data.		
53.0	Demonstrate proficiency in table normalization by combining the techniques of an entity relationship model or a top-down, business approach to data with normalization or a bottom-up mathematical approach to data. – The student will be able to:		
53.01	Compare the normalization and entity relationship modeling (ERM) techniques in terms of strengths and weaknesses.		
53.02	Further define normalization and explain its benefits.		
53.03	Place tables in third normal form.		
53.04	Explain how logical data modeling rules ensure normalized tables.		
53.05	Specify referential integrity constraints and design indices.		
54.0	Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database. – The student will be able to:		
54.01	Evaluate the transformation of business requirements into an initial layout and design for a database.		
54.02	Construct simple web page design for personal work folder.		
54.03	Evaluate existing web sites and determine quality of design.		
55.0	Extend the logical model presentation model by normalizing the data and mapping the management system. – The student will be able to:		
55.01	Formulate a plan of action for the Database Project using skills previously learned in this course.		
55.02	Normalize a logical model to the third normal form (3NF).		
55.03	Create a table in the database using a database authoring tool.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	55.04 Demonstrate ability to edit tables using a database authoring tool.		
	55.05 Create forms that will display the table components created with a database authoring tool.		
56.0	Apply techniques for building a storage management system by creating a website using templates and wizards. – The student will be able to:		
	56.01 Create a web site that displays the database project home.		
	56.02 Link a web site to create a web-enabled interface to the industry database.		
	56.03 Edit the forms created and specify appropriate field labels for data entry.		
57.0	Demonstrate design and functionality by constructing a group business presentation. – The student will be able to:		
	57.01 Evaluate and generate criteria for a formal, business presentation.		
	57.02 Construct a persuasive group presentation using the guidelines set forth in class.		
58.0	Demonstrate comprehension of database modeling competency through group presentation. – The student will be able to:		
	58.01 Deliver a formal business presentation for the class that discusses an entity-relationship model and initial database design.		
	58.02 Demonstrate the functionality of the database and the layout/design capabilities of a database authoring tool.		
	58.03 Prepare appropriate end-user documentation.		
	58.04 Self-assess learning experience through the presentation and demonstration of their final database project.		
59.0	Demonstrate comprehension that the database management software is a system for organizing the storage unit (or database) according to business needs and rules, through data integrity constraints. – The student will be able to:		
	59.01 Identify the structural elements of a relational database table.		
	59.02 List and describe the system development life cycle.		
	59.03 Describe the industry implementation of the relational database management system (RDBMS) and object relational database management system (ORDBMS).		
	59.04 Explain how SQL and languages that extend SQL are used in the industry product set.		
	59.05 Identify the advantages of a database management system.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
60.0	Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements. – The student will be able to:		
60.01	List the capabilities of SQL SELECT statements.		
60.02	Execute a basic select statement.		
60.03	Differentiate between SQL statements and language commands that extend SQL.		
61.0	Demonstrate proficiency working with columns, characters, and rows in SQL. – The student will be able to:		
61.01	Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.		
61.02	Use column aliases to rename columns in the query result.		
61.03	Eliminate duplicate rows in the query result.		
61.04	Display the structure of a table.		
61.05	Apply SQL syntax to restrict the rows returned from a query.		
61.06	Demonstrate application of the WHERE clause syntax.		
61.07	Construct and produce output using a SQL query containing character strings and date values.		
62.0	Demonstrate proficiency in using SQL comparison operators. – The student will be able to:		
62.01	Apply the proper comparison operator to return a desired result.		
62.02	Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result.		
62.03	Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable.		
62.04	Explain the use of comparison conditions and NULL.		
63.0	Demonstrate proficiency in using logical comparisons and precedence rules. – The student will be able to:		
63.01	Evaluate logical comparisons to restrict the rows returned based on two or more conditions.		
63.02	Apply the rules of precedence to determine the order in which expressions are evaluated and calculated.		
63.03	Construct a query to order a results set for single or multiple columns.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
63.04 Construct a query to sort a results set in ascending or descending order.		
64.0 Demonstrate proficiency using SQL single row functions. – The student will be able to:		
64.01 Perform calculations on data.	MAFS.912.N-Q.1.1, MAFS.912.N-CN.1.2, MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3, MAFS.912.F-BF.1.1, MAFS.912.F-BF.1.2	
64.02 Modify individual data items.		
64.03 Use character, number and date functions in SELECT statements.		
64.04 Format data and numbers for display purposes.		
64.05 Convert column data types.		
65.0 Demonstrate proficiency displaying data from multiple tables. – The student will be able to:		
65.01 Construct select statements to access data from more than one table using equity and non-equality joins.		
65.02 Use outer joins through viewing data that generally does not meet a join condition.		
65.03 Join a table to itself.		
66.0 Demonstrate proficiency aggregating data using group functions. – The student will be able to:		
66.01 Identify the available group functions and describe their use.		
66.02 Demonstrate the ability to group data through the use of the GROUP BY clause.		
66.03 Demonstrate the ability to include or exclude grouped rows by using the HAVING clause.		
67.0 Demonstrate proficiency utilizing subqueries. – The student will be able to:		
67.01 Write a query with an embedded subquery.		
67.02 Evaluate and perform a multiple-column subquery.		
67.03 Describe and explain the behavior of subqueries when null values are retrieved.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	67.04 Create a subquery in a FROM clause.		
68.0	Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language. – The student will be able to:		
	68.01 Produce queries that require an input variable.		
	68.02 Customize the SQL language interface and reporting environment using SET commands for control.		
	68.03 Produce more readable output through the use of the column and break commands.		
	68.04 Describe data manipulation language (DML) and describe various DML statements.		
	68.05 Utilize data manipulation language (DML) through inserting, updating and deleting rows from a table.		
	68.06 Control transactions using COMMIT and ROLLBACK statements.		
69.0	Demonstrate proficiency creating and managing database objects. – The student will be able to:		
	69.01 Describe the main database objects.		
	69.02 Create tables and alter their definitions.		
	69.03 Describe the data types that can be used when specifying column definition.		
70.0	Demonstrate proficiency altering tables and constraints implementing views. – The student will be able to:		
	70.01 Create, drop, rename and truncate tables using SQL.		
	70.02 Identify and describe various constraints including not null, unique, primary key, foreign key, and check.		
	70.03 Create and maintain constraints including adding, dropping, enabling, disabling, and cascading.		
	70.04 Recognize views and explain how they are created, how they retrieve data and how they perform DML operations.		
71.0	Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects. – The student will be able to:		
	71.01 Create views, retrieve data through a view, alter the definition of a view and drop a view.		
	71.02 Categorize information by using Top-N queries to retrieve specified data.		
	71.03 Identify the features of a sequence and display sequence values using a data dictionary view.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	71.04 Identify the characteristics of a cached sequence.		
	71.05 Modify and remove a sequence using a SQL statement.		
	71.06 Identify the features of private and public synonyms.		
	71.07 Identify characteristics of an index and describe different types.		
	71.08 Create and remove an index using a SQL statement.		
72.0	Demonstrate ability to control user access and SQL language interface and reporting tool. – The student will be able to:		
	72.01 Identify the features of database security.		
	72.02 Create users using SQL statements.		
	72.03 Grant and revoke object privileges using a SQL language interface and reporting tool.		
73.0	Demonstrate comprehension of bundling features of SQL. – The student will be able to:		
	73.01 List and describe the benefits of extension languages to SQL.		
	73.02 Recognize the basic SQL block and its sections.		
	73.03 Declare SQL variables and describe their significance.		
	73.04 Execute a SQL block.		
74.0	Demonstrate comprehension working with composite data types by writing executable script files. – The student will be able to:		
	74.01 Recognize the significance of the executable section and decide when to use it.		
	74.02 Write statements in the executable section.		
	74.03 Describe the rules of nested blocks.		
	74.04 Identify and utilize appropriate coding conventions.		
	74.05 Create a script that will insert, update, merge and delete data in a table.		

Florida Department of Education
Student Performance Standards

Course Title: **SQL Extension Languages I**
Course Number: **9007320**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to extensions of the SQL programming language.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
75.0 Describe the differences between SQL and SQL extension languages. – The student will be able to:		
75.01 Describe SQL extension languages.		
75.02 Differentiate between SQL and SQL extension languages.		
75.03 Explain the need for and benefits of SQL extension languages.		
76.0 Create program blocks. – The student will be able to:		
76.01 Describe the structure of a program block.		
76.02 Identify the different types of program blocks.		
76.03 Identify program programming environments.		
76.04 Create and execute an anonymous block.		
76.05 Output messages in program blocks.		
77.0 Use variables in program blocks. – The student will be able to:		
77.01 Describe how variables are used in program blocks.		
77.02 Identify the syntax for using variables.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
77.03 Declare and initialize variables.		
77.04 Assign new values to variables.		
78.0 Recognize lexical units. – The student will be able to:		
78.01 Describe the types of lexical units.		
78.02 Describe identifiers and identify valid and invalid identifiers.		
78.03 Describe and identify reserved words, delimiters, literals, and comments.		
79.0 Recognize data types. – The student will be able to:		
79.01 Describe the data type categories.		
79.02 Give examples of scalar, composite, and large object (LOB) data types.		
79.03 Identify when an object becomes eligible for garbage collection.		
80.0 Use scalar data types. – The student will be able to:		
80.01 Declare and use scalar data types.		
80.02 Define guidelines for declaring and initializing variables.		
81.0 Use various types of joins. – The student will be able to:		
81.01 Construct and execute SELECT statements using an equijoin.		
81.02 Construct and execute SELECT statements using a non-equijoin.		
81.03 Construct and execute SELECT statements using an outer join.		
81.04 Construct and execute SELECT statements that result in a Cartesian product.		
82.0 Use SQL group functions and subqueries. – The student will be able to:		
82.01 Construct and execute an SQL query using group functions to determine a sum total, an average amount, and a maximum value.		
82.02 Construct and execute an SQL query that groups data based on specified criteria.		
82.03 Construct and execute an SQL query that contains a WHERE clause using a single-row subquery.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
82.04 Construct and execute an SQL query that contains a WHERE clause using a multiple-row subquery.		
83.0 Write executable statements. – The student will be able to:		
83.01 Construct variable assignment statements.		
83.02 Construct statements using built-in SQL functions.		
83.03 Differentiate between implicit and explicit data type conversions.		
83.04 Describe when implicit data type conversions take place.		
83.05 List the drawbacks of implicit data type conversions.		
83.06 Construct statements using functions to explicitly convert data types.		
83.07 Construct statements using operators.		
84.0 Use nested blocks and variable scope. – The student will be able to:		
84.01 Understand the scope and visibility of variables.		
84.02 Write nested blocks and qualify variables with labels.		
84.03 Describe the scope of an exception.		
84.04 Describe the effect of exception propagation in nested blocks.		
85.0 Use good programming practices. – The student will be able to:		
85.01 List examples of good programming practices.		
85.02 Insert comments into code.		
85.03 Follow formatting guidelines when writing code.		
86.0 Write DML statements to manipulate data. – The student will be able to:		
86.01 Construct and execute a statement to insert data into a table.		
86.02 Construct and execute a statement to update data in a table.		
86.03 Construct and execute a statement to delete data from a table.		
86.04 Construct and execute a statement to merge data into a table.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
87.0	Retrieve data. – The student will be able to:		
87.01	Identify SQL statements that can be directly included in an executable block.		
87.02	Construct and execute an INTO clause to hold values returned by a single-row SELECT statement.		
87.03	Construct statements that retrieve data.		
88.0	Manipulate data. – The student will be able to:		
88.01	Construct and execute statements that manipulate data with DML statements.		
88.02	Describe when to use implicit or explicit cursors.		
88.03	Create code to use SQL implicit cursor attributes to evaluate cursor activity.		
89.0	Use transaction control statements. – The student will be able to:		
89.01	Define a transaction and give an example.		
89.02	Construct and execute a transaction control statement.		
90.0	Use IF conditional control statements. – The student will be able to:		
90.01	Construct and use an IF statement.		
90.02	Construct and use an IF -ELSIF statement.		
90.03	Create PL/SQL to handle null conditions in an IF statement.		
91.0	Use CASE conditional control statements. – The student will be able to:		
91.01	Construct and use CASE statements.		
91.02	Construct and use CASE expressions.		
91.03	Include syntax to handle null conditions in a CASE statement.		
91.04	Include syntax to handle Boolean conditions in IF and CASE statements.		
92.0	Use basic LOOP iterative control statements. – The student will be able to:		
92.01	Describe the types of LOOP statements and their uses.		
92.02	Create a program containing a basic loop and an EXIT statement.		
92.03	Create a program containing a basic loop and an EXIT statement with conditional termination.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
93.0 Use WHILE and FOR loop iterative control statements. – The student will be able to:		
93.01 Construct and use the WHILE looping construct.		
93.02 Construct and use the FOR looping construct.		
93.03 Describe when a WHILE loop is used.		
93.04 Describe when a FOR loop is used.		
94.0 Use nested loop iterative control statements–The student will be able to:		
94.01 Construct and execute a program using nested loops.		
94.02 Evaluate a nested loop construct and identify the exit point.		
95.0 Use explicit cursors. – The student will be able to:		
95.01 List the guidelines for declaring and controlling explicit cursors.		
95.02 Create code to open a cursor and fetch a piece of data into a variable.		
95.03 Use a simple loop to fetch multiple rows from a cursor.		
95.04 Create code to close a cursor.		
96.0 Use explicit cursor attributes. – The student will be able to:		
96.01 Define a record structure.		
96.02 Create code to process the row of an active set using record types in cursors.		
96.03 Use cursor attributes to retrieve information about the state of an explicit cursor.		
97.0 Use cursor FOR loops. – The student will be able to:		
97.01 List and explain the benefits of using Cursor FOR loops.		
97.02 Create code to declare a cursor and manipulate it in a FOR loop.		
97.03 Create code containing a Cursor FOR loop using a subquery.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
98.0 Use cursors with parameters. – The student will be able to:		
98.01 List the benefits of using parameters with cursors.		
98.02 Create code to declare and manipulate a cursor with a parameter.		
99.0 Use cursors for update transactions. – The student will be able to:		
99.01 Create code to lock rows before an update using the appropriate clause.		
99.02 Explain the effect of using NOWAIT in an update cursor declaration.		
99.03 Create code to use the current row of the cursor in an UPDATE or DELETE statement.		
100.0 Use multiple cursors. – The student will be able to:		
100.01 Explain the need for using multiple cursors to produce multilevel reports.		
100.02 Create code to declare and manipulate multiple cursors within nested loops.		
100.03 Create code to declare and manipulate multiple cursors using parameters.		
101.0 Handle exceptions. – The student will be able to:		
101.01 Describe the advantages of including exception handling code.		
101.02 Describe the purpose of an EXCEPTION section in a program block.		
101.03 Create code to include an EXCEPTION section.		
101.04 List the guidelines for exception handling.		
102.0 Trap server exceptions. – The student will be able to:		
102.01 Distinguish between errors defined by the server and those defined by the programmer.		
102.02 Differentiate between errors that are handled implicitly and explicitly by the server.		
102.03 Write code to trap a predefined server error.		
102.04 Write code to trap a non-predefined server error.		
102.05 Write code to identify an exception by error code and by error message.		
103.0 Trap user-defined exceptions. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
103.01 Write code to name a user-defined exception.		
103.02 Write code to raise an exception.		
103.03 Write code to handle a raised exception.		

Florida Department of Education
Student Performance Standards

Course Title: **SQL Extension Languages II**
Course Number: **9007330**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to extensions of the SQL programming language.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
104.0 Create procedures. – The student will be able to:		
104.01 Differentiate between anonymous blocks and subprograms.		
104.02 Identify the benefits of using subprograms.		
104.03 Describe a stored procedure.		
104.04 Create a procedure.		
104.05 Describe how a stored procedure is invoked.		
105.0 Use parameters in procedures. – The student will be able to:		
105.01 Describe how parameters contribute to a procedure.		
105.02 Define a parameter.		
105.03 Create a procedure using a parameter.		
105.04 Invoke a procedure that has parameters.		
105.05 Distinguish between formal and actual parameters.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
106.0 Pass parameters. – The student will be able to:		
106.01 List the types of parameter modes.		
106.02 Create a procedure that passes parameters.		
106.03 Identify methods for passing parameters.		
106.04 Describe the default option for parameters.		
107.0 Create stored functions. – The student will be able to:		
107.01 Describe the difference between a stored procedure and a stored function.		
107.02 Create a program block containing a function.		
107.03 Identify ways in which functions may be invoked.		
107.04 Create a program block that invokes a function that has parameters.		
108.0 Use functions in SQL statements. – The student will be able to:		
108.01 Describe where user-defined functions can be called from within an SQL statement.		
108.02 Describe the restrictions on calling functions from SQL statements.		
108.03 Describe the purpose of the Data Dictionary.		
108.04 Differentiate between the three types of Data Dictionary views.		
108.05 Write SQL SELECT statements to retrieve information from the Data Dictionary.		
109.0 Manage procedures and functions. – The student will be able to:		
109.01 Describe how exceptions are propagated.		
109.02 Remove a function and a procedure.		
109.03 Use Data Dictionary views to identify and manage stored procedures.		
110.0 Manage object privileges. – The student will be able to:		
110.01 List and explain several object privileges.		
110.02 Explain the function of the EXECUTE object privilege.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
110.03 Write SQL statements to grant and revoke object privileges.		
111.0 Use invoker's rights. – The student will be able to:		
111.01 Contrast invoker's rights with definer's rights.		
111.02 Create a procedure that uses invoker's rights.		
112.0 Create packages. – The student will be able to:		
112.01 Describe a package, its components, and the reasons for use.		
112.02 Create packages containing related variables, cursors, constants, exceptions, procedures, and functions.		
112.03 Create a program block that invokes a package construct.		
113.0 Manage package constructs. – The student will be able to:		
113.01 Explain the difference between public and private package constructs.		
113.02 Designate a package construct as either public or private.		
113.03 Specify the syntax to drop a package.		
113.04 Identify Data Dictionary views used to manage packages.		
113.05 Identify the guidelines for using packages.		
114.0 Use advanced package concepts. – The student will be able to:		
114.01 Write packages that use the overloading feature.		
114.02 Write packages that use forward declarations.		
114.03 Explain the purpose of a package initialization block.		
114.04 Identify restrictions on using packaged functions in SQL statements.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
115.0 Manage persistent state of package variables. – The student will be able to:		
115.01 Identify persistent states of package variables.		
115.02 Control the persistent state of a package cursor.		
116.0 Use vendor-supplied packages. – The student will be able to:		
116.01 Describe two common uses for vendor-supplied packages.		
116.02 Use the syntax to specify messages for a vendor-supplied package.		
116.03 Identify the exceptions used in conjunction with vendor-supplied packages.		
117.0 Understand dynamic SQL. – The student will be able to:		
117.01 Identify the stages through which all SQL statements pass.		
117.02 Describe the reasons for using dynamic SQL to create an SQL statement.		
117.03 List statements supporting Native Dynamic SQL.		
118.0 Understand triggers. – The student will be able to:		
118.01 Describe database triggers and their uses.		
118.02 Differentiate between a database trigger and an application trigger.		
118.03 List the guidelines for using triggers.		
118.04 Compare and contrast database triggers and stored procedures.		
119.0 Create DML triggers. – The student will be able to:		
119.01 Create a DML trigger and identify its components.		
119.02 Create a statement level trigger.		
119.03 Describe the trigger firing sequence options.		
119.04 Create a DML trigger that uses conditional predicates.		
119.05 Create a row level trigger.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
119.06 Create a row level trigger that uses OLD and NEW qualifiers.		
119.07 Create an INSTEAD OF trigger.		
120.0 Create DDL and database event triggers. – The student will be able to:		
120.01 Describe the events that cause DDL and database event triggers to fire.		
120.02 Create a trigger for a DDL statement.		
120.03 Create a trigger for a database event.		
120.04 Describe the functionality of the CALL statement.		
120.05 Describe the cause of a mutating table.		
121.0 Manage triggers. – The student will be able to:		
121.01 View trigger information in the Data Dictionary.		
121.02 Disable and enable a database trigger.		
121.03 Remove a trigger from the database.		
122.0 Use large object data types. – The student will be able to:		
122.01 Compare and contrast LONG and LOB data types.		
122.02 Describe LOB data types and how they are used.		
122.03 Differentiate between internal and external LOBs.		
122.04 Create and maintain LOB data types.		
122.05 Migrate data from LONG to LOB.		
123.0 Manage binary types. – The student will be able to:		
123.01 Define binary column data type.		
123.02 Create directory objects and view them in the Data Dictionary.		
123.03 Manage and manipulate binary types.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
124.0 Manage indexes. – The student will be able to:		
124.01 Create and manipulate user-defined records.		
124.02 Create an index.		
124.03 Describe the difference between records, tables, and indexes.		
125.0 Manage dependencies. – The student will be able to:		
125.01 Describe the implications of procedural dependencies.		
125.02 Contrast dependent objects and referenced objects.		
125.03 View dependency information in the Data Dictionary.		
125.04 Use a script to create the objects required to display dependencies.		
125.05 Use views to display dependencies.		
125.06 Describe how to minimize dependency failures.		

Florida Department of Education
Student Performance Standards

Course Title: **Custom Database Programming**
Course Number: **9007340**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to specialized applications of the SQL programming language.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
126.0 Program a database application. – The student will be able to:		
126.01 Utilize loop statements.		
126.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.		
126.03 Create user-defined functions.		
126.04 Utilize common built-in functions.		
126.05 Declare variables in modules and procedures.		
126.06 Declare arrays, and initialize elements of arrays.		
126.07 Declare and use object variables and collections, and use their associated properties and methods.		
126.08 Declare symbolic constants, and make them available locally or publicly.		
126.09 Respond to events.		
127.0 Utilize the basic concepts of database design. – The student will be able to:		
127.01 Apply basic concepts of normalization.		
127.02 Utilize the cascade update and cascade delete options.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
128.0 Utilize SQL and union queries. – The student will be able to:		
128.01 Utilize SQL to write common queries.		
128.02 Refer to objects by using SQL.		
128.03 Utilize union queries.		
129.0 Implement program statements using objects. – The student will be able to:		
129.01 Determine when to use data access objects.		
129.02 Differentiate between objects and collections.		
129.03 Write statements that access and modify database objects.		
129.04 Utilize data access objects.		
129.05 Select appropriate methods and property settings for use with specified objects.		
130.0 Utilize debugging tools and write error handlers. – The student will be able to:		
130.01 Trap errors.		
130.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.		
130.03 Debug code samples.		
130.04 Utilize the Debugger to monitor variable values.		
130.05 Write an error handler.		
131.0 Demonstrate file I/O. – The student will be able to:		
131.01 Read from files.		
131.02 Write to files.		
131.03 Utilize record locking.		
132.0 Create forms and identify all the properties of a form. – The student will be able to:		
132.01 Choose form-specific and report-specific properties to set.		
132.02 Choose control properties to set.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
132.03 Assign event-handling procedures to controls in a form.		
132.04 Define and create form and report modules.		
132.05 Identify the scope of a form or report module.		
132.06 Open multiple instances of a form, and refer to them.		
132.07 Assign values to form properties.		
132.08 Use form methods.		
133.0 Manipulate data using object models. – The student will be able to:		
133.01 Connect to a data source.		
133.02 Open a recordset.		
133.03 Insert, update, merge and delete data.		
134.0 Develop custom controls. – The student will be able to:		
134.01 Set properties for custom controls.		
134.02 Customize user interface controls.		
135.0 Utilize API functions. – The student will be able to:		
135.01 Properly declare functions.		
135.02 Use the by value and by reference parameters.		
136.0 Demonstrate database replication and implement database replication using programming tools. – The student will be able to:		
136.01 Make a database replicable.		
136.02 View a synchronization schedule.		
136.03 Explain how synchronization conflicts are resolved.		
136.04 Identify the advantages of using replication of synchronization.		
136.05 Identify the changes that the database engine makes when it converts a nonreplicable database into replicable database.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
137.0 Analyze and implement security options. – The student will be able to:		
137.01 Analyze a scenario, and recommend an appropriate type of security.		
137.02 Explain the steps for implementing security.		
137.03 Analyze code to ensure that it sets security options.		
137.04 Write code to implement security options.		
138.0 Implement client/server applications. – The student will be able to:		
138.01 Demonstrate SQL pass through queries and application queries.		
138.02 Access external data.		
138.03 Trap errors that are generated by the server.		
138.04 Optimize connections.		
138.05 Optimize performance for a given client/server application.		
139.0 Optimize the performance of a database. – The student will be able to:		
139.01 Differentiate between single-field and multiple-field indexes.		
139.02 Optimize queries.		
139.03 Restructure queries to allow faster execution.		
139.04 Optimize performance in distributed applications.		
139.05 Optimize performance for client/server applications.		
140.0 Perform application distribution. – The student will be able to:		
140.01 Prepare an application for distribution.		
140.02 Analyze various methods to distribute a client/server application.		
140.03 Distribute custom controls with an application.		
140.04 Provide online help.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
141.0 Test and debug databases. – The student will be able to:		
141.01 Implement error handling.		
141.02 Test and debug library databases.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **.NET Application Development & Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9007400
CIP Number	0511020314
Grade Level	9-12, 30, 31
Standard Length	7 credits
Teacher Certification	BUS ED 1 @2 COMP SCI 6 COMP PROG 7 G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the fundamentals of programming and software development; procedural and object-oriented programming; creating .NET-based applications, including testing, monitoring, debugging, documenting, and maintaining .NET applications.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points, with OCPs A, B, and C comprising the Software Development Core.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	9007210 9007220	Foundations of Programming Procedural Programming	1 credit 1 credit	15-1131	3 3	VO
C	9007230	Object-Oriented Programming Fundamentals	1 credit	15-1131	3	VO
D	9007410 9007420 9007430	.NET Application Development Foundation .NET Application Development Applied .NET Application Development Capstone	1 credit 1 credit 1 credit	15-1131	3 3 3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9007210	2/87 2%	7/80 9%	22/83 27%	4/69 6%	23/67 34%	4/70 6%	3/69 4%	23/82 28%	6/66 9%	26/74 35%	4/72 6%
9007220	21/87 24%	21/80 26%	2/83 2%	21/69 30%	2/67 3%	20/70 29%	21/69 30%	2/82 2%	16/66 24%	2/74 3%	21/72 30%
9007230	20/87 23%	20/80 25%	1/83 1%	20/69 29%	1/67 1%	20/70 29%	20/69 29%	1/82 1%	15/66 23%	1/74 1%	21/72 28%
9007410	#	#	#	#	#	#	#	#	#	#	#
9007420	#	#	#	#	#	#	#	#	#	#	#
9007430	#	#	#	#	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	40/45 89%
9007210	11/67 16%	10/75 13%	10/54 19%	#	#	#	#
9007220	14/67 21%	10/75 13%	11/54 20%	#	#	#	#
9007230	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
9007410	#	#	#	#	#	#	#
9007420	#	#	#	#	#	#	#
9007430	#	#	#	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 17.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in .NET Application Development & Programming.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in .NET Application Development & Programming.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in .NET Application Development & Programming.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
19.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
20.0 Distinguish between iterative and non-iterative program control structures.
21.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
22.0 Describe the processes, methods, and conventions for software development and maintenance.
23.0 Explain the types, uses, and limitations of testing for ensuring quality control.
24.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
25.0 Describe information security risks, threats, and strategies associated with software development.
26.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
27.0 Solve problems using critical thinking skills, creativity and innovation.
28.0 Use information technology tools.
29.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in .NET Application

Development & Programming.

30.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in .NET Application Development & Programming.

31.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in .NET Application Development & Programming.

32.0 Design a computer program to meet specific physical, operational, and interaction criteria.

33.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.

34.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.

35.0 Create a unit test plan, implement the plan, and report the results of testing.

36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.

37.0 Describe the importance of professional ethics and legal responsibilities.

38.0 Explain key concepts that distinguish object-oriented programming from procedural programming.

39.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.

40.0 Design, document, and create object-oriented computer programs.

41.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results

42.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.

43.0 Understand .NET primitive data types and their uses.

44.0 Describe the types and characteristics of lexical units in the .NET programming language.

45.0 Construct statements that use various .NET operators.

46.0 Construct and use .NET selection control structures.

47.0 Construct and use .NET iterative control structures.

48.0 Construct and use .NET structures for error handling.

49.0 Write .NET programs that define and use user-defined data types, including classes.

50.0 Write .NET programs that define and use methods.

51.0 Write programs that perform console input and output in a .NET program.

52.0 Use namespaces in a .NET program.

53.0 Use arrays in .NET programs.

54.0 Write .NET programs that use the object-oriented concept of inheritance.

55.0 Write .NET programs that use the object-oriented concept of polymorphism.

56.0 Write .NET programs that use the object-oriented concept of encapsulation.

57.0 Apply common programming style guidelines and conventions.

58.0 Use application life cycle management to develop and maintain .NET programs.

59.0 Use nullable values in a .NET program.

60.0 Use the .NET String and StringBuilder classes in an application.

61.0 Use .NET classes to perform stream input/output.

62.0 Use recursive functions to solve problems in .NET programs.

63.0 Write .NET programs that use interfaces.

64.0 Use .NET collections in applications.

65.0 Demonstrate knowledge of different types of .NET applications.

66.0 Demonstrate knowledge of .NET architecture and tools.

67.0 Demonstrate knowledge of Web applications.

68.0 Develop Web pages using HTML, CSS, JavaScript, and ASP.NET.
69.0 Develop .NET Windows Form applications.
70.0 Develop Windows Service applications and class libraries.
71.0 Demonstrate knowledge of database applications.
72.0 Demonstrate knowledge of structured query language (SQL) statements.
73.0 Develop .NET database applications.
74.0 Successfully work as a member of a software development team.
75.0 Manage time according to a plan.
76.0 Keep acceptable records of progress problems and solutions.
77.0 Plan, organize, and carry out a project plan.
78.0 Manage resources.
79.0 Use tools, materials, and processes in an appropriate and safe manner.
80.0 Demonstrate an understanding of the software development process.
81.0 Research content related to the project and document the results following industry conventions.
82.0 Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience.
83.0 Demonstrate competency in the area of expertise related to developing computer software using the .NET framework.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Foundations of Programming**
Course Number: **9007210**
Course Credit: **1**

Course Description:

This course introduces concepts, techniques, and processes associated with computer programming and software development. After successful completion of Programming Foundations and Procedural Programming, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in .NET Application Development & Programming.		
01.01	Key Ideas and Details		
01.01.1		Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2		Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
01.02.1		Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2		Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3		Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas		
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity		
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in .NET Application Development & Programming.		
02.01	Text Types and Purposes		
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing		
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards			Correlation to CTE Program Standard #
		capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0		Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in .NET Application Development & Programming.	
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:		
18.01 Describe the evolution of programming and programming careers.	MAFS.912.A-REI.1.1	
18.02 Identify tasks performed by programmers.	MAFS.912.N-Q.1.1	
18.03 Describe how businesses use computer programming to solve business problems.	MAFS.912.A-REI.1.1	
18.04 Investigate job opportunities in the programming field.		
18.05 Explain different specializations and the related training in the computer programming field.	MAFS.912.A-REI.1.1 MAFS.912.G-SRT.1.2	
18.06 Explain the need for continuing education and training of computer programmers.	MAFS.912.A-REI.1.1	
18.07 Explain enterprise software systems and how they impact business.	MAFS.912.A-REI.1.1	
18.08 Describe ethical responsibilities of computer programmers.	MAFS.912.A-REI.1.1	
18.09 Describe the role of customer support to software program quality.	MAFS.912.A-REI.1.1	
18.10 Identify credentials and certifications that may improve employability for a computer programmer.	MAFS.912.N-Q.1.1	
18.11 Identify devices, tools, and other environments for which programmers may develop software.	MAFS.912.G-CO.4.12; MAFS.912.N-Q.1.1	
19.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:		
19.01 Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.	MAFS.912.N-Q.1.2	
19.02 Explain the types and uses of variables in programs.	MAFS.912.A-REI.1.1; MAFS.912.A-SSE.1.1	
19.03 Determine the best data type to use for given programming problems.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.04	Identify the types of operations that can be performed on different data types.	MAFS.912.N-Q.1.1	
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
19.06	Explain how computers store different data types in memory.	MAFS.912.A-REI.1.1	
19.07	Demonstrate the difference between "data" and "information".		
19.08	Use different number systems to represent data.	MAFS.912.N-Q.1.1	
19.09	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.	MAFS.912.A-REI.1.1	
19.10	Use Boolean logic to perform logical operations.		
20.0	Distinguish between iterative and non-iterative program control structures–The student will be able to:		
20.01	Explain non-iterative programming structures (*e.g.*, if, if/else and their uses.	MAFS.912.A-REI.1.1	
20.02	Explain iterative programming structures (*e.g.*, while, do/while) and their uses.	MAFS.912.A-REI.1.1	
21.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:		
21.01	Identify the characteristics, uses, and limits of low-level programming languages.	MAFS.912.N-Q.1.1	
21.02	Identify the characteristics, uses, and limits of high-level programming languages.	MAFS.912.N-Q.1.1	
21.03	Identify the characteristics, uses, and limits of rapid development programming languages.	MAFS.912.N-Q.1.1	
21.04	Describe object-oriented concepts.	MAFS.912.A-REI.1.1	
21.05	Explain the characteristics of procedural and object-oriented programming languages.	MAFS.912.A-REI.1.1	
21.06	Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).	MAFS.912.G-SRT.1.2	
22.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:		
22.01	Describe and explain tools used in software development.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	
22.02	Describe the stages of the program life cycle.	MAFS.912.A-REI.1.1	
22.03	Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).	MAFS.912.G-SRT.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
22.04	List and explain the steps in the program development cycle.	MAFS.912.A-REI.1.1	
22.05	Describe different types of documentation used in the program development cycle (*e.g.*, requirements document, program design documents, test plans).	MAFS.912.N-Q.1.1	
22.06	Describe the on-going need for program maintenance.	MAFS.912.A-REI.1.1	
22.07	Describe different methods companies use to facilitate program updates for enhancements and defects (*e.g.*, how customers receive patches, updates, new versions, upgrades).	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
22.08	Describe different methods used to facilitate version control and change management.	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
23.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:		
23.01	Explain the uses and limits of testing in ensuring program quality.	MAFS.912.A-REI.1.1	SC.912.N.1.1
23.02	Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.1	
23.03	Describe data and the use of test plans/scripts to be used in program testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
23.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
23.05	Identify the data to be used for boundary conditions.	MAFS.912.N-Q.1.1	
23.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	SC.912.N.1.1
24.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:		
24.01	Describe different design methodologies and their uses (*e.g.*, object-oriented design, structured design, and rapid application development).	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.3.5
24.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).	MAFS.912.A-REI.1.1	SC.912.N.1.1
24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.	MAFS.912.A-REI.1.1	
24.04	Participate and contribute to a design review of a program design developed using a common program design tool (*e.g.*, UML, flowcharts, design documents, pseudocode).	MAFS.912.A-CED.1.1	SC.912.N.1.1, SC.912.N.1.3, SC.912.N.2.4, SC.912.N.4.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	24.05 Write a program design document using UML or other standard design methodology.	MAFS.912.A-CED.1.1	
	24.06 Define input and output for a program module using UML or other standard design methodology.	MAFS.912.F-IF.1.1	
25.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:		
	25.01 Explain the security risks to personal and business computer users.	MAFS.912.S-IC.2.6	
	25.02 Identify different types of threats to computer systems.	MAFS.912.N-Q.1.1	
	25.03 Identify methods to protect against different threats to computer systems.	MAFS.912.N-Q.1.1	
	25.04 Understand the importance of a disaster/emergency response plan.		
	25.05 Identify alternative methods for data storage and backup (*e.g.*, mirroring, fail-over, high availability, types of backups).	MAFS.912.N-Q.1.1	
26.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
	26.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		SC.912.N.1.9, SC.912.N.1.10
	26.02 Locate, organize and reference written information from various sources.		SC.912.N.1.1.6
	26.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	MAFS.912.A-CED.1.1	SC.912.N.1.1.9, SC.912.N.1.1.10
	26.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.	MAFS.912.G-SRT.1.2	SC.912.N.1.1.5, SC.912.N.1.1.6, SC.912.N.1.1.8
	26.05 Apply active listening skills to obtain and clarify information.		
	26.06 Develop and interpret tables and charts to support written and oral communications.	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.1 MAFS.912.F-IF.3.9	SC.912.N.1.1.6-11
	26.07 Exhibit public relations skills that aid in achieving customer satisfaction.		
27.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	27.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	MAFS.912.G-CO.3.9	SC.912.N.1.1
	27.02 Employ critical thinking and interpersonal skills to resolve conflicts.	MAFS.912.G-CO.3.9	SC.912.N.1.3, SC.912.N.4.1
	27.03 Identify and document workplace performance goals and monitor progress toward	MAFS.912.N-Q.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	those goals.		
27.04	Conduct technical research to gather information necessary for decision-making.	MAFS.912.S-IC.2.6; MAFS.912.S-IC.1.1	SC.912.N.1.3, SC.912.N.1.1.5
28.0	Use information technology tools. – The student will be able to:		
28.01	Use personal information management (PIM) applications to increase workplace efficiency.		
28.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.	MAFS.912.G-CO.4.12	
28.03	Employ computer operations applications to access, create, manage, integrate, and store information.	MAFS.912.Z-CED.1.1	
28.04	Employ collaborative/groupware applications to facilitate group work.		

Florida Department of Education
Student Performance Standards

Course Title: **Procedural Programming**
Course Number: **9007220**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts with a focus on the creation of software applications employing procedural programming techniques. After successful completion of Programming Foundations and Procedural Programming, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in .NET Application Development & Programming.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards			Correlation to CTE Program Standard #
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in .NET Application Development & Programming.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	

Florida Standards			Correlation to CTE Program Standard #
		including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in .NET Application Development & Programming.	
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.0 Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:		
32.01 Choose appropriate data types depending on the needs of the program.	MAFS.912.N-Q.1.1	
32.02 Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).	MAFS.912.N-Q.1.2	
32.03 Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).	MAFS.912.A-REI.1.1	
32.04 Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).	MAFS.912.N-Q.1.1	
32.05 Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).	MAFS.912.N-Q.1.1	
33.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:		
33.01 Use appropriate naming conventions to define program variables and modules (methods, functions).	MAFS.912.N-Q.1.1	
33.02 Use a program editor to write the source code for a program.	MAFS.912.A-REI.1.1	
33.03 Write programs that use selection structures (*e.g.*, if, if/else).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.04 Write programs that use repetition structures (*e.g.*, while, do/while).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.05 Write programs that use nested structures.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.06 Use internal documentation (*e.g.*, single-line and multi-line comments, program headers, module descriptions, meaningful variable and function/module names) to		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	document a program according to accepted standards.		
33.07	Compile and run programs.	MAFS.912.A-REI.1.1	
33.08	Write programs that use standard arithmetic operators with different numerical data types.	MAFS.912.N-Q.1.1; MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2 MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
33.09	Write programs that use standard logic operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.10	Write programs that use a variety of common data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2 MAFS.912.N-Q.1.1, MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
33.11	Write programs that perform data conversion between standard data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.12	Write programs that define, use, search, and sort arrays.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.13	Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.14	Demonstrate understanding and use of appropriate variable scope.	MAFS.912.A-REI.1.1	
34.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:		
34.01	Write programs that perform user input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).	MAFS.912.A-CED.1.1;	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		MAFS.912.A-CED.1.2	
	34.03 Write program modules such as functions, subroutines, or methods.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.04 Write program modules that accept arguments.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.05 Write program modules that return values.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.06 Write program modules that validate arguments and return error codes.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.07 Write interactive programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.08 Write programs that use standard libraries to enhance program function.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	34.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.		
35.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:		
	35.01 Write a unit test plan that identifies the input data and expected results for program tests.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	35.02 Test and debug programs, including programs written by others.	MAFS.912.A-REI.1.1	
	35.03 Write a test report that identifies the results of testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	35.04 Trace through the function of a program to ensure valid operation.	MAFS.912.N-Q.1.1	
	35.05 Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).	MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.2	
	35.06 Create a disaster/emergency response plan for a computer system.	MAFS.912.A-CED.1.1; MAFS.912.A-	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		CED.1.2	
36.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
36.01	Employ leadership skills to accomplish organizational goals and objectives.		
36.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
36.03	Conduct and participate in meetings to accomplish work tasks.		
37.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
37.01	Evaluate and justify decisions based on ethical reasoning.	MAFS.912.S-IC.2.6	
37.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	MAFS.912.S-IC.2.6	
37.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	MAFS.912.S-IC.2.6; MAFS.912.A-REI.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Object-Oriented Programming Fundamentals**
Course Number: **9007230**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts with a focus on the creation of software applications employing object-oriented programming techniques. After successful completion of Object-Oriented Programming Fundamentals, students will have met Occupational Completion Point C, Computer Programmer, SOC Code 15-1131.

Florida Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in .NET Application Development & Programming.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in .NET Application Development & Programming.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in .NET Application Development & Programming.		
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
38.0 Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:		
38.01 Demonstrate the understanding and use of classes, objects, attributes, and behaviors.	MAFS.912.A-REI.1.1	
38.02 Demonstrate the understanding and use of inheritance.	MAFS.912.A-REI.1.1	
38.03 Demonstrate the understanding and use of data encapsulation.	MAFS.912.A-REI.1.1	
38.04 Demonstrate the understanding and use of polymorphism.	MAFS.912.A-REI.1.1	
39.0 Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements. – The student will be able to:		
39.01 Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.	MAFS.912.A-REI.1.1	
39.02 Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.	MAFS.912.A-REI.1.1	
39.03 Design an object-oriented program using UML or another standard design methodology.	MAFS.912.H-CED.1.1	
39.04 Work with other team members to develop a project plan for a program.	MAFS.912.A-REI.1.1	
39.05 Work with other team members to write a design document for a program with multiple functions and shared data.	MAFS.912.A-REI.1.1	
39.06 Participate in design meetings that review program design documents for conformance to program requirements.	MAFS.912.S.IC.2.6	
39.07 Estimate the time to develop a program or module.	MAFS.912.S.IC.2.6	
40.0 Design, document, and create object-oriented computer programs. – The student will be able to:		
40.01 Compare and contrast recursive functions to other iterative methods.	MAFS.912.G-SRT.1.2	
40.02 Understand the implementation of character strings in the programming language.		
40.03 Write programs that perform string processing (e.g., string manipulation, string	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
compares, concatenation).		
40.04 Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.05 Write object-oriented programs that use inheritance.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.06 Write object-oriented programs that use polymorphism.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.07 Develop class constructors.	MAFS.912.S-MD.1.3	
40.08 Write programs that define and use program constants.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.09 Write programs that perform error handling.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.10 Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.	MAFS.912.S-IC.2.6	
40.11 Write programs that perform dynamic memory allocation.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.12 Write programs that perform effective management of dynamically allocated memory.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.13 Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal and external) related to version control.	MAFS.912.A-REI.1.1	
40.14 Write programs that use complex data structures (e.g., stacks, queues, trees, linked list).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.15 Write programs that are event-driven.	MAFS.912.A-CED.1.1; MAFS.912.A-	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		CED.1.2	
	40.16 Write programs that perform file input and output (i.e., sequential and random access file input/output).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	40.17 Perform basic database commands including connect, open, select, and close.	MAFS.912.A-REI.1.1	
41.0	Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results. – The student will be able to:		
	41.01 Develop a test plan for an object-oriented program.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.02 Write test plans for event-driven programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.03 Write test plans for programs that perform file input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.04 Perform test and debug activities on object-oriented programs, including those written by someone else.	MAFS.912.A-REI.1.1	
	41.05 Perform test and debug activities on an event-driven program.	MAFS.912.A-REI.1.1	
	41.06 Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.	MAFS.912.A-REI.1.1	
	41.07 Document the findings of testing in a test report.	MAFS.912.S-CP.1.4	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **.NET Application Development Foundation**
Course Number: **9007410**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to the Internet and Internet-based software applications.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
42.0	Develop an awareness of the changes taking place in the information age and how they fit into an evolving society. – The student will be able to:		
42.01	Cite examples of jobs, salary, and opportunities he/she will have as a .NET programmer.		
42.02	Describe the role a database plays in a business.		
42.03	Explain the value of middleware, such as the .NET framework, in developing software applications.		
42.04	Understand the importance of clear communication when discussing business informational requirements.		
43.0	Understand .NET primitive data types and their uses. – The student will be able to:		
43.01	Describe how variables are used in programs.		
43.02	Identify the .NET built-in value types, their uses, and the ranges of values supported by each type.		
43.03	Identify the default values for built-in value types.		
43.04	Write statements that declare and initialize variables.		
43.05	Write statements that assign literal values to numeric types.		
43.06	Identify the .NET built-in reference types.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
43.07	Write statements that assign string literals to string types.		
43.08	Explain the memory size requirements for the various data storage types.		
43.09	Identify which types are stored on the heap and which are stored on the stack.		
43.10	Identify which data type should be used for a given purpose in a program.		
43.11	Write statements that create variables with values that cannot be changed (i.e., const, final).		
43.12	Identify the syntax for declaring and initializing each of the built-in data types.		
43.13	Differentiate between implicit and explicit data type conversions.		
43.14	Describe when implicit data type conversions take place.		
43.15	Write statements that use explicit type conversion.		
43.16	List the drawbacks of implicit data type conversions.		
43.17	Compare and contrast boxing and unboxing.		
43.18	Describe the scope of a variable.		
43.19	Describe how the compiler uses scope to distinguish between variables with the same name.		
44.0	Describe the types and characteristics of lexical units in the .NET programming language. – The student will be able to:		
44.01	Describe the types of lexical units (e.g., keywords, directives, operators).		
44.02	Describe identifiers and identify valid and invalid identifiers.		
44.03	Describe and identify reserved words, delimiters, literals, and comments.		
45.0	Construct statements that use various .NET operators. – The student will be able to:		
45.01	Construct statements using arithmetic operators.		
45.02	Construct statements using relational operators.		
45.03	Construct and use statements using logical operators.		
45.04	Construct and use statements using assignment operators.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	45.05 Construct and execute statements using operator precedence.		
	45.06 Construct and execute statements using methods and fields of the Math class.		
46.0	Construct and use .NET selection control structures. – The student will be able to:		
	46.01 Construct and use an if structure in a program.		
	46.02 Construct and use an if/else structure in a program.		
	46.03 Construct and use multiple-selection structures (e.g., switch, elseif, select) in programs.		
	46.04 Construct and use nested selection structures in a program.		
	46.05 Construct and use a conditional operator.		
47.0	Construct and use .NET iterative control structures. – The student will be able to:		
	47.01 Describe the types of iterative control structures and their uses.		
	47.02 Construct and use a while structures (e.g., while, do/while, do/until) in a program.		
	47.03 Construct and use a for structure in a program.		
	47.04 Construct and use a control structure that iterates over each item in a collection (e.g., foreach, for/each/next).		
	47.05 Describe the limits and advantages of different iterative control structure (i.e., while, do/while, for, foreach or for/each).		
	47.06 Construct and use nested structures (iterative and selective) in a program.		
	47.07 Write programs that alter the execution of program loops (e.g., break, continue, exit).		
48.0	Construct and use .NET structures for error handling. – The student will be able to:		
	48.01 Describe the different types of software errors.		
	48.02 Compare and contrast alternatives for handling errors.		
	48.03 Write programs that validate user input and handle errors.		
	48.04 Explain the correct method for using multiple catch blocks for exceptions.		
	48.05 Explain the purpose of the finally block in exception handling.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
48.06	Write programs that handle exceptions using the try/catch/finally structure.		
48.07	Write programs with nested exception handling.		
48.08	Explain the concept of structured exception handling.		
48.09	Identify common exceptions and their causes.		
48.10	Explain the concept of throwing a new exception.		
48.11	Write programs that catch and re-throw exceptions.		
48.12	Write exception handlers that use characteristics of the exception argument in the program.		
49.0	Write .NET programs that define and use user-defined data types, including classes. – The student will be able to:		
49.01	Explain the concept of a user-defined data type.		
49.02	Distinguish between structures and classes.		
49.03	Identify the syntax for declaring enumerations and structures.		
49.04	Write programs that use declare and use enumerations.		
49.05	Write programs that declare and use structures.		
49.06	Explain the characteristics of different class constructs including instance variables, properties, fields, methods, events, object references, and constructors.		
49.07	Write programs that declare and use classes.		
49.08	Distinguish between different types of classes, including base class, derived class, abstract class, and sealed class.		
49.09	Explain the impact of using different access modifiers on user-defined data types.		
49.10	Use access modifiers in a program to control visibility to variables and user-defined data types.		
49.11	Explain the this reference and its uses.		
50.0	Write .NET programs that define and use methods. – The student will be able to:		
50.01	Identify the benefits of using methods.		
50.02	Describe the different types of class methods and their purposes.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	50.03 Create class methods that do and do not return values.		
	50.04 Write statements that invoke a method.		
	50.05 Create a method using arguments.		
	50.06 Invoke a method that has arguments.		
	50.07 Describe a method signature.		
	50.08 Describe the purpose of overloading methods.		
	50.09 Write programs that have overloaded methods.		
	50.10 Define methods that have default arguments.		
	50.11 Describe the conflict between overloaded methods and default arguments.		
	50.12 Explain the impact of using different access modifiers on class methods.		
	50.13 Write methods that use argument modifiers (e.g., out, ref, byref, byval, const).		
51.0	Write programs that perform console input and output in a .NET program. – The student will be able to:		
	51.01 Use the Console class to read and write data from the console.		
	51.02 Write statements that use escape sequences.		
	51.03 Write statements that format string and numeric output.		
	51.04 Write statements that use the ToString method to output data.		
52.0	Use namespaces in a .NET program. – The student will be able to:		
	52.01 Compare and contrast assemblies and namespaces.		
	52.02 Describe the use of namespaces in .NET programming.		
	52.03 Describe commonly used .NET namespaces (e.g., System, System.IO, System.Collections, System.Drawing).		
	52.04 Identify the correct namespace to include for specified classes.		
	52.05 Write programs that define a namespace.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	52.06 Create namespaces that abide by standard naming convention.		
53.0	Use arrays in .NET programs. – The student will be able to:		
	53.01 Write statements to declare and initialize an array.		
	53.02 Demonstrate the use of initializer lists.		
	53.03 Write methods that take an array as an argument.		
	53.04 Write methods that return an array to the calling method.		
	53.05 Write statements to update, and destroy arrays.		
	53.06 Explain linear and binary searching.		
	53.07 Use the static methods of the Array class to perform searches, binary searches, and sorts.		
	53.08 Demonstrate the use of multidimensional arrays.		
	53.09 Demonstrate the use of jagged arrays (array of arrays).		
54.0	Write .NET programs that use the object-oriented concept of inheritance. – The student will be able to:		
	54.01 Explain the purpose and use of inheritance in object oriented programming.		
	54.02 Compare and contrast single and multiple inheritance.		
	54.03 Explain the purpose and implementation of classes that cannot serve as a base class (a sealed class).		
	54.04 Describe has-a and is-a relationships.		
	54.05 Create class hierarchies using inheritance.		
	54.06 Declare and use a class derived from another class (implementing an is-a relationship).		
	54.07 Declare and use a class where the derived class overrides methods of the base class.		
	54.08 Declare and use a class that contains another class as a data member (implementing a has-a relationship).		
	54.09 Write statements that determine at run time whether an instance of a class is derived from a specific base class or interface.		
	54.10 Write statements that invoke a method of the base class from a derived class.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	54.11 Identify which class methods can be inherited and which cannot.		
	54.12 Explain how access modifiers affect the inheritance of class variables and methods.		
55.0	Write .NET programs that use the object-oriented concept of polymorphism. – The student will be able to:		
	55.01 Explain the purpose and implementation of classes that cannot be instantiated (an abstract class).		
	55.02 Explain the purpose and implementation of virtual class methods that must be overridden by derived classes.		
	55.03 Explain the use of abstract classes in enforcing polymorphism.		
	55.04 Create an abstract class.		
	55.05 Create classes that derive from an abstract class.		
	55.06 Create a program that uses polymorphism.		
56.0	Write .NET programs that use the object-oriented concept of encapsulation. – The student will be able to:		
	56.01 Define and use classes that use access modifiers (e.g., private, public, protected, internal, internal protected) to provide encapsulation of data.		
	56.02 Explain the restrictions on using accessibility levels.		
	56.03 Compare and contrast different types of variable scope, including block, procedure, module/class, and project scope.		
	56.04 Compare and contrast different types of method scope, including public, private, protected, friend, and protectedfriend.		
	56.05 Write programs that use local variables.		
	56.06 Describe the scope of a given variable.		
	56.07 Describe how the compiler uses scope to distinguish between variables with the same name.		
	56.08 Explain the purpose and use of static classes, variables and methods.		
	56.09 Write programs that create and use static classes, variables, and methods.		
57.0	Apply common programming style guidelines and conventions. – The student will be able to:		
	57.01 List examples of good programming practices.		
	57.02 Insert comments into code.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	57.03 Follow formatting guidelines when writing code.		
	57.04 Define guidelines for declaring and initializing variables.		
58.0	Use application life cycle management to develop and maintain .NET programs. – The student will be able to:		
	58.01 Describe the stages in the life cycle of an application.		
	58.02 Describe tools used to manage each stage in the life cycle of an application and how each is used to ensure the integrity of the product.		
	58.03 Describe how the needs of the customer affect the development of an application.		
	58.04 Describe the different types of testing that are performed on an application.		
	58.05 Describe the role of tools such as UML (Unified Modeling Language) in ensuring the integrity of the application.		
	58.06 Describe different types of UML diagrams and guidelines for their use.		
	58.07 Develop a class based on its description in a UML diagram.		
	58.08 Read an application specification and translate it into a working program.		
	58.09 Describe the characteristics of different types of application development (e.g., Agile development).		
	58.10 Compare and contrast different methodologies for application development (e.g., Scrum, XP, Crystal, FDD, DSDM).		
	58.11 Describe different methods for deploying applications.		
59.0	Use nullable values in a .NET program. – The student will be able to:		
	59.01 Describe the use of nullable value types.		
	59.02 Describe the use of the null value in .NET programs.		
	59.03 Write statements to declare and initialize nullable value types.		
	59.04 Write statements to determine if a nullable value type currently has a value.		

Florida Department of Education
Student Performance Standards

Course Title: **.NET Application Development Applied**
Course Number: **9007420**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to the Internet and Internet-based software applications.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
60.0	Use the .NET String and StringBuilder classes in an application. – The student will be able to:		
60.01	Compare and contrast the String and StringBuilder classes.		
60.02	Identify the performance implications of using the String and StringBuilder classes for different purposes.		
60.03	Use the methods of the String class to compare, search, format, split and join strings.		
60.04	Use the methods of the String and StringBuilder classes to find, replace, delete, and insert substrings.		
60.05	Use the methods of the String class to translate a string into uppercase or lowercase.		
60.06	Use culture information to modify strings.		
61.0	Use .NET classes to perform stream input/output. – The student will be able to:		
61.01	Compare and contrast .NET classes used to perform file input/output (e.g., StreamReader, StreamWriter, StringReader, StringWriter, MemoryStream, BinaryReader, BinaryWriter).		
61.02	Compare and constrast .NET classes used to manipulate files and directories (e.g., Directory, DirectoryInfo, File, FileInfo, Path).		
61.03	Use .NET classes to search, add, and delete directories.		
61.04	Use .NET classes to search, add, and delete files.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
61.05 Use .NET classes to read and write text to a file.		
61.06 Use .NET classes to read and write objects of a variety of types to a file.		
61.07 Use .NET classes to read and write binary data to a file.		
61.08 Compare and contrast .NET classes used to compress data (e.g., GZipStream, DeflateStream).		
61.09 Use .NET classes to read and write compressed data to a file.		
62.0 Use recursive functions to solve problems in .NET programs. – The student will be able to:		
62.01 Describe the use of recursive methods in solving problems.		
62.02 Describe the difference of iterative and recursive methods.		
62.03 Demonstrate the use of direct recursion.		
62.04 Demonstrate the use of indirect recursion.		
63.0 Write .NET programs that use interfaces. – The student will be able to:		
63.01 Describe interfaces and their use in .NET programming.		
63.02 Declare and use a class that implements a standard interface.		
63.03 Compare and contrast inheritance from a base class and inheritance of an interface.		
63.04 Identify common interfaces and their purposes (e.g., IComparable, IComparer, IEquatable, IDisposable, IFormattable, IConvertible).		
63.05 Define and use a custom interface.		
63.06 Write classes that implement common interfaces (e.g., IComparable, IComparer, IEquatable, IDisposable, IFormattable, IConvertible).		
63.07 Describe the program to interface principle and its benefits.		
64.0 Use .NET collections in applications. – The student will be able to:		
64.01 Compare and contrast common non-generic collection classes, including ArrayList, BitArray, HashTable, Queue, and Stack.		
64.02 Write programs that use common non-generic collection classes.		
64.03 Compare and contrast non-generic collection classes to generic collection classes.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
64.04	Compare and contrast common generic collection classes, including Dictionary, LinkedList, Queue, SortedDictionary, SortedList, and Stack.		
64.05	Write programs that use common generic collection classes.		
64.06	Identify the collection class that is the best choice for different application requirements.		
64.07	Use iterators to access individual members of different types of collections.		
64.08	Use standard methods to add, delete, and modify members of different types of collections.		
64.09	Write statements to access members of a dictionary based on a key.		
64.10	Write statements to determine the existence of members of a dictionary based on a key or a value.		
65.0	Demonstrate knowledge of different types of .NET applications. – The student will be able to:		
65.01	Compare and contrast different types of .NET applications (e.g., Console, Windows Form, WPF, Windows Service, Class Library, Web, database).		
65.02	Choose the best type of application to develop for a given application scenario.		
65.03	Describe the characteristics and capabilities of a console application.		
65.04	Develop, test, and debug a console application.		
65.05	Write a console application that uses command-line arguments.		
66.0	Demonstrate knowledge of .NET architecture and tools. – The student will be able to:		
66.01	Describe components of the .NET architecture, including the Common Language Runtime (CLR), just-in-time (JIT) compiler, intermediate language (IL).		
66.02	Describe the steps required for a managed assembly to be built and run in the .NET environment.		
66.03	Compile single-file and multi-file assemblies using command-line tools.		
66.04	Describe common command-line tools used in developing .NET applications (e.g.,Al.exe, Caspol.exe, Ildasm.exe, Makecert.exe, Sn,exe, Gacutil.ext,) and their purposes.		
66.05	Use a signing tool to sign an assembly.		
66.06	Use a disassembly tool to view the classes, members, and methods of an assembly.		
66.07	Describe the garbage collection process.		
67.0	Demonstrate knowledge of Web applications. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
67.01	Describe the Web as a platform for applications.		
67.02	Compare and contrast static and dynamic content.		
67.03	Describe how Web pages are loaded to a computer from the Internet including the hardware, software, servers, and protocols required.		
67.04	Compare and contrast server-side and client-side programming.		
67.05	Describe how a Web browser downloads and renders a Web page.		
67.06	Describe options and methodology for Web site deployment.		
67.07	Compare and contrast different Web development technologies, including HTML, CSS, JavaScript, CGI scripts, XML, and ASP.NET.		
67.08	Describe common Web page terminology (e.g., page life cycle, the Web page event model, Web Page state management, cookies, virtual directories).		
67.09	Define the steps in the page life cycle of an ASP.NET Web page.		
67.10	Describe state management as it related to maintenance of page information.		
67.11	Describe how Web services are accessed from a client application.		
67.12	Describe the PostBack mechanism for posting data to a Web page using ASP.NET.		
67.13	Describe the role of Internet Information Services (IIS).		
67.14	Describe the role of Internet Service Providers (ISP) and the services they provide.		
67.15	Describe Web services and related tools (e.g., Extensible Markup Language (XML), Simple Object Access Protocol (SOAP) and Web Service Definition Language (WSDL).		
67.16	Describe the characteristics and purposes of Application objects and Session objects that are maintained by the ASP.NET run-time engine.		
67.17	Describe the common ASP.NET events for applications and sessions (i.e., application start, application end, application error, session start, session end).		
67.18	Describe entities that define standards for Internet applications (e.g., WS3, OASIS, WS-I).		
68.0	Develop Web pages using HTML, CSS, JavaScript, and ASP.NET. – The student will be able to:		
68.01	Describe the characteristics and capabilities of a Web application.		
68.02	Develop Web pages using HTML (Hyper-text Markup Language) that include commonly used tags to define Web pages with hyperlinks, tables, text, headings, images, backgrounds, and frames.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
68.03	Develop Web pages using CSS (cascading style sheets) to define a uniform appearance across multiple Web pages.		
68.04	Develop Web pages using JavaScript to define and implement interactive content.		
68.05	Define and use functions in JavaScript.		
68.06	Define and use local and global variables using JavaScript.		
68.07	Use conditional operators in JavaScript to selectively perform specific function.		
68.08	Use Boolean conditions in JavaScript to selectively perform with multiple conditions.		
68.09	Use JavaScript loops to perform iteration.		
68.10	Use string objects and escape sequences in a JavaScript.		
68.11	Use JavaScript to access, use, and modify HTML elements.		
68.12	Use JavaScript to handle common events, including mouse events, key events, and page events.		
68.13	Use JavaScript to create and manage forms within a Web page.		
68.14	Develop Web pages that use ASP.NET to provide interactivity.		
68.15	Describe standards for making Web pages accessible to individuals with disabilities.		
68.16	Develop Web pages that conform to accessibility standards.		
69.0	Develop .NET Windows Form applications. – The student will be able to:		
69.01	Describe the characteristics and capabilities of a Windows Forms application.		
69.02	Compare and contrast common objects used in Windows Forms applications (e.g., Button, CheckBox, ColorDialog, ComboBox, DateTimePicker, GroupBox, Label, LinkLabel, ListBox, MenuStrip, Panel, PicureBox, RadioButton, ToolTip).		
69.03	Develop an interactive Windows Forms application that uses a variety of objects for input and output.		
69.04	Perform data validation on input fields.		
69.05	Describe the Windows Forms event model.		
69.06	Create Windows Forms application that respond to common events, including mouse events, keyboard events, load events, click events, resize events, and drag events.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
69.07	Define Windows Forms applications with graphical user interfaces (GUI) that conform to appropriate usability guidelines.		
69.08	Create Windows Forms applications that use Multiple Document Interface (MDI) and Single Document Interface (SDI).		
69.09	Describe visual inheritance.		
69.10	Develop a Windows Forms application that inherits a form from a base application.		
70.0	Develop Windows Service applications and class libraries. – The student will be able to:		
70.01	Describe the characteristics and capabilities of a Windows Service application.		
70.02	Describe the states in the lifetime of a service.		
70.03	Describe the ServiceBase and ServiceController classes and their role in developing and controlling Windows Service applications.		
70.04	Develop a Windows Service application.		
70.05	Develop an installer for a Windows Service application.		
70.06	Install and deploy a Windows Service application.		
70.07	Test and debug a Windows Service application.		
70.08	Uninstall a Windows Service application.		
70.09	Develop, test, and debug a Class Library.		
71.0	Demonstrate knowledge of database applications. – The student will be able to:		
71.01	Explain common database terminology (e.g., relationships, normalization, fields, records, data integrity, referential integrity).		
71.02	Describe the benefits and characteristics of relational databases.		
71.03	Define primary keys and foreign keys and describe their purposes.		
71.04	Explain how database design fits into the database application development process.		
71.05	Translate an entity-relationship model into a relational database design.		
71.06	Differentiate between one-to-one, one-to-many, and many-to-many relationships.		
71.07	Move data from an unnormalized form through to a third normal form.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
71.08	Based on information requirements, define database tables that ensure data integrity and reduce redundant data.		
71.09	Describe routine maintenance for databases.		
72.0	Demonstrate knowledge of structured query language (SQL) statements. – The student will be able to:		
72.01	Describe the data manipulation language (DML) and describe various DML statements.		
72.02	List the capabilities of SQL SELECT statements.		
72.03	Write and execute a basic SELECT statement.		
72.04	Write and execute SELECT statements using the WHERE clause with common operators (i.e., =, <>, >, <, >=, <=, BETWEEN, LIKE, IN).		
72.05	Write and execute SELECT statements using the WHERE clause with logical operators, including AND and OR.		
72.06	Write and execute SELECT statements using the ORDER BY clause.		
72.07	Write and execute SELECT statements using wildcards.		
72.08	Write and execute UPDATE statements to modify rows in a table.		
72.09	Write and execute INSERT statements to insert rows into a table.		
72.10	Write and execute DELETE statements to delete rows in a table.		
72.11	Write and execute statements using JOIN to select data from two or more related tables.		
72.12	Write and execute statements that use SQL to perform common calculations (e.g., AVG, MAX, MIN, SUM).		
73.0	Develop .NET database applications. – The student will be able to:		
73.01	Describe the purpose of ActiveX Data Objects (ADO).		
73.02	Describe the purpose of the ADO connection object.		
73.03	Write statements to connect to a database.		
73.04	Write statements to open a database.		
73.05	Write statements to create a recordset.		
73.06	Write statements to commit a transaction to a database.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
73.07 Write statements to rollback a transaction to a database.		
73.08 Write statements to close a connection to a database.		
73.09 Develop, test, and debug a database application.		
73.10 Develop, test, and debug a WPF application.		

Florida Department of Education
Student Performance Standards

Course Title: **.NET Application Development Capstone**
Course Number: **9007430**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to the Internet and Internet-based software applications.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
74.0	Successfully work as a member of a software development team. – The student will be able to:		
74.01	Accept responsibility for specific tasks in a given situation.		
74.02	Document progress, and provide feedback on work accomplished in a timely manner.		
74.03	Complete assigned tasks in a timely and professional manner.		
74.04	Reassign responsibilities when the need arises.		
74.05	Complete daily tasks as assigned on one's own initiative.		
75.0	Manage time according to a plan. – The student will be able to:		
75.01	Set realistic time frames and schedules.		
75.02	Keep a written record of work accomplished on a daily basis.		
75.03	Meet goals and objectives set by the team.		
75.04	Identify individual priorities.		
75.05	Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities, as needed.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
76.0	Keep acceptable records of progress problems and solutions. – The student will be able to:		
76.01	Develop and use a record keeping system to record daily progress.		
76.02	Use a project journal to identify problem statement.		
76.03	Develop a portfolio of work accomplished to include requirements documents, design documents and UML, project and test plans, and prototypes.		
77.0	Plan, organize, and carry out a project plan. – The student will be able to:		
77.01	Identify a substantive problem that can be addressed with a .NET software solution.		
77.02	Identify and document the potential customers for the project.		
77.03	Identify and document the customer requirements for the project including use case definitions.		
77.04	Document the proposed user interface for the project using common tools (e.g., mockups, event planning documents).		
77.05	Identify the hardware and software requirements for the project.		
77.06	Identify the programming tools required to develop the project.		
77.07	Write a detailed design document for the project.		
77.08	Write a detailed test plan for the project that addresses varying levels of testing including system testing and usability testing.		
77.09	Determine the scope of a project.		
77.10	Organize the team according to individual strengths.		
77.11	Assign specific tasks within a team.		
77.12	Determine project priorities.		
77.13	Identify required resources to complete the project.		
77.14	Plan, research, design, develop, and evaluate activities, as required.		
77.15	Carry out the project plan to successful completion.		
77.16	Document design problems, test results, product defects, and resolutions.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
78.0	Manage resources. – The student will be able to:		
78.01	Identify required resources for each stage of the project plan.		
78.02	Determine the methods needed to acquire needed resources.		
78.03	Demonstrate good judgment in the use of resources.		
78.04	Recycle and reuse resources where appropriate.		
78.05	Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.		
79.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:		
79.01	Identify the proper tool for a given job.		
79.02	Use tools and machines in a safe manner.		
79.03	Adhere to laboratory or job site safety rules and procedures.		
79.04	Identify the application of processes appropriate to the task at hand.		
79.05	Identify materials appropriate to their application.		
80.0	Demonstrate an understanding of the software development process. – The student will be able to:		
80.01	State the goals of the software application clearly.		
80.02	Identify and write a plan to achieve each goal.		
80.03	Develop a list of materials and content required for each goal.		
80.04	Develop a step-by-step procedure for developing the application.		
80.05	Follow a written procedure.		
80.06	Record data from evaluation activities.		
80.07	Document conclusions and solutions based on evaluation results, observations and data.		
80.08	Document progress using a project log.		
80.09	Write an abstract describing the project plan.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
81.0	Research content related to the project and document the results following industry conventions. – The student will be able to:		
81.01	Identify the basic research needed to develop the project plan.		
81.02	Identify available resources for completing background research required in the project plan.		
81.03	Demonstrate the ability to locate resource materials in a library, database, Internet and other research resources.		
81.04	Demonstrate the ability to organize information retrieval.		
81.05	Demonstrate the ability to prepare a topic outline.		
81.06	Write a draft of the research report.		
81.07	Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.		
81.08	Prepare an electronically composed research paper in proper form.		
81.09	Conduct an alpha and beta evaluation of the project's product.		
81.10	Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.		
82.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:		
82.01	Prepare a multi-media presentation on the completed project.		
82.02	Make an oral presentation about the project using the multi-media materials.		
82.03	Review the presentation, and make changes in the delivery method(s) to improve presentation skills.		
83.0	Demonstrate competency in the area of expertise related to developing computer software using the .NET framework. – The student will be able to:		
83.01	Demonstrate a mastery of the content of the selected subject area.		
83.02	Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.		
83.03	Demonstrate the ability to apply the knowledge, experience and skill developed in the previous program completion to the successful completion of this demonstration.		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Web Application Development & Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Secondary – Career Preparatory	
Program Number	9007500
CIP Number	0511020102
Grade Level	9-12, 30, 31
Standard Length	7 credits
Teacher Certification	BUS ED 1 @2 COMP SCI 6 COMP PROG 7 G
CTSO	FBLA BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the fundamentals of programming and software development; procedural and object-oriented programming; creating web-based applications, including testing, monitoring, debugging, documenting, and maintaining applications.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points, with OCPs A, B, and C comprising the Software Development Core.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8207310	Digital Information Technology	1 credit	15-1151	2	PA
B	9007210 9007220	Foundations of Programming Procedural Programming	1 credit 1 credit	15-1131	3 3	VO
C	9007230	Object-Oriented Programming Fundamentals	1 credit	15-1131	3	VO
D	9007510 9007520 9007530	Web Programming JavaScript Programming PHP Programming	1 credit 1 credit 1 credit	15-1131	3 3 3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1	Environmental Science
8207310	5/87 6%	5/80 6%	24/83 29%	5/69 7%	24/67 36%	5/70 7%	5/69 7%	24/82 29%	5/66 8%	24/74 32%	5/72 7%
9007210	2/87 2%	7/80 9%	22/83 27%	4/69 6%	23/67 34%	4/70 6%	3/69 4%	23/82 28%	6/66 9%	26/74 35%	4/72 6%
9007220	21/87 24%	21/80 26%	2/83 2%	21/69 30%	2/67 3%	20/70 29%	21/69 30%	2/82 2%	16/66 24%	2/74 3%	21/72 30%
9007230	20/87 23%	20/80 25%	1/83 1%	20/69 29%	1/67 1%	20/70 29%	20/69 29%	1/82 1%	15/66 23%	1/74 1%	21/72 28%
9007510	2/87 2%	2/80 3%	1/83 1%	2/69 3%	1/67 1%	2/69 3%	1/82 1%	2/66 3%	1/74 1%	2/72 3%	1/70 1%
9007520	2/87 2%	2/80 3%	1/83 1%	1/69 1%	1/67 1%	2/69 3%	1/82 1%	2/66 3%	1/74 1%	1/72 1%	#

9007530	1/87 1%	#	1/83 1%	1/69 1%	1/67 1%	1/69 1%	1/82 1%	1/66 2%	1/74 1%	1/72 1%	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
8207310	20/67 30%	15/75 20%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	40/45 89%
9007210	11/67 16%	10/75 13%	10/54 19%	#	#	#	#
9007220	14/67 21%	10/75 13%	11/54 20%	#	#	#	#
9007230	11/67 16%	8/75 11%	11/54 20%	#	#	#	#
9007510	4/67 6%	3/75 4%	2/54 4%	#	#	#	#
9007520	8/67 12%	12/75 16%	0/54 0%	#	#	#	#
9007530	3/67 4%	2/75 3%	1/54 2%	#	#	#	#

** *Alignment pending review* # *Alignment attempted, but no correlation to academic course*

Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary

for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Web Application Development & Programming.
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Web Application Development & Programming.
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Web Application Development & Programming.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Develop an awareness of microprocessors and digital computers.
06.0 Demonstrate an understanding of operating systems.
07.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Use technology to enhance communication skills utilizing presentation applications.
09.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Use technology to enhance communication skills utilizing electronic mail.
11.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
12.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
13.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
14.0 Demonstrate competence in page design applicable to the WWW.
15.0 Develop an awareness of emerging technologies.
16.0 Develop awareness of computer languages and software applications.
17.0 Demonstrate comprehension and communication skills.
18.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
19.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
20.0 Distinguish between iterative and non-iterative program control structures.
21.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
22.0 Describe the processes, methods, and conventions for software development and maintenance.
23.0 Explain the types, uses, and limitations of testing for ensuring quality control.
24.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
25.0 Describe information security risks, threats, and strategies associated with software development.
26.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
27.0 Solve problems using critical thinking skills, creativity and innovation.
28.0 Use information technology tools.
29.0 Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Application Development & Programming.
30.0 Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Application Development & Programming.

31.0 Methods and strategies for using Florida State Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Web Application Development & Programming.
32.0 Design a computer program to meet specific physical, operational, and interaction criteria.
33.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
34.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
35.0 Create a unit test plan, implement the plan, and report the results of testing.
36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
37.0 Describe the importance of professional ethics and legal responsibilities.
38.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
39.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
40.0 Design, document, and create object-oriented computer programs.
41.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
42.0 Demonstrate proficiency using HTML and XHTML to create web content.
43.0 Demonstrate proficiency using cascading style sheets (CSS) to format web pages.
44.0 Demonstrate proficiency using basic client-side scripting to control the content and the behavior of HTML and XHTML documents.
45.0 Demonstrate an understanding of JavaScript programming fundamentals.
46.0 Demonstrate proficiency in assigning and handling variables in JavaScript programs and functions.
47.0 Use event handlers in JavaScript programs and functions.
48.0 Recognize and assign data types appropriate to their use.
49.0 Demonstrate proficiency in using appropriate operators to achieve a planned output.
50.0 Write executable statements.
51.0 Demonstrate an understanding of variable scope.
52.0 Use good programming practices.
53.0 Demonstrate use of the Document Object Module (DOM).
54.0 Use conditional control statements in JavaScript.
55.0 Use iterative control statements in JavaScript.
56.0 Use nested loop iterative control statements in JavaScript.
57.0 Use JavaScript to produce input and output for programs.
58.0 Demonstrate proficiency in using Form Objects in JavaScript programs and functions.
59.0 Demonstrate proficiency in using methods in JavaScript programs and functions.
60.0 Demonstrate proficiency in using parameters in JavaScript programs and functions.
61.0 Utilize debugging techniques in programs.
62.0 Recognize security risks in programs.
63.0 Use plug-ins and libraries.
64.0 Demonstrate proficiency in programming for mobile delivery technology (e.g., iPhone/Android).
65.0 Demonstrate an understanding of Personal Home Page (PHP) programming language.
66.0 Demonstrate proficiency in PHP configuration.
67.0 Demonstrate an understanding of PHP language basics.
68.0 Demonstrate proficiency in the use of server processes.
69.0 Demonstrate an understanding of object-oriented programming in PHP.
70.0 Demonstrate proficiency in writing PHP code to handle file input/output (I/O) operations.

71.0 Demonstrate proficiency in creating, populating, and using arrays in PHP.
72.0 Demonstrate proficiency handling strings in PHP.
73.0 Demonstrate proficiency in using PHP to access databases via Open Database Connectivity (ODBC).
74.0 Demonstrate proficiency in applying best practices for ensuring creation of a secure program.
75.0 Demonstrate an understanding of key technologies, protocols, and architectures associated with web development and programming.

Florida Department of Education
Student Performance Standards

Course Title: **Digital Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards. After successful completion of this core course, students will have met Occupational Completion Point A, Information Technology Assistant - SOC Code 15-1151.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 17.0) have been placed in a separate document. To access this document, visit: Digital Information Technology (8207310).

Florida Department of Education
Student Performance Standards

Course Title: **Foundations of Programming**
Course Number: **9007210**
Course Credit: **1**

Course Description:

This course introduces concepts, techniques, and processes associated with computer programming and software development. After successful completion of Programming Foundations and Procedural Programming, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida State Standards			Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida State Standards for grades 09-10 reading in Technical Subjects for student success in Web Application Development & Programming.		
01.01	Key Ideas and Details		
	01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure		
	01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
	01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
	01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question	

Florida State Standards			Correlation to CTE Program Standard #
		the author seeks to address. LAFS.910.RST.2.6	
	01.03	Integration of Knowledge and Ideas	
	01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
	01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
	01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
	01.04	Range of Reading and Level of Text Complexity	
	01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0		Methods and strategies for using Florida State Standards for grades 09-10 writing in Technical Subjects for student success in Web Application Development & Programming.	
	02.01	Text Types and Purposes	
	02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
	02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
	02.02	Production and Distribution of Writing	
	02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
	02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
	02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida State Standards			Correlation to CTE Program Standard #
		individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
	02.03	Research to Build and Present Knowledge	
	02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
	02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
	02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
	02.04	Range of Writing	
	02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida State Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Web Application Development & Programming.		
	03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	03.04	Model with mathematics. MAFS.K12.MP.4.1	
	03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	03.06	Attend to precision. MAFS.K12.MP.6.1	
	03.07	Look for and make use of structure.	

Florida State Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:		
18.01 Describe the evolution of programming and programming careers.	MAFS.912.A-REI.1.1	
18.02 Identify tasks performed by programmers.	MAFS.912.N-Q.1.1	
18.03 Describe how businesses use computer programming to solve business problems.	MAFS.912.A-REI.1.1	
18.04 Investigate job opportunities in the programming field.		
18.05 Explain different specializations and the related training in the computer programming field.	MAFS.912.A-REI.1.1 MAFS.912.G-SRT.1.2	
18.06 Explain the need for continuing education and training of computer programmers.	MAFS.912.A-REI.1.1	
18.07 Explain enterprise software systems and how they impact business.	MAFS.912.A-REI.1.1	
18.08 Describe ethical responsibilities of computer programmers.	MAFS.912.A-REI.1.1	
18.09 Describe the role of customer support to software program quality.	MAFS.912.A-REI.1.1	
18.10 Identify credentials and certifications that may improve employability for a computer programmer.	MAFS.912.N-Q.1.1	
18.11 Identify devices, tools, and other environments for which programmers may develop software.	MAFS.912.G-CO.4.12; MAFS.912.N-Q.1.1	
19.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:		
19.01 Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.	MAFS.912.N-Q.1.2	
19.02 Explain the types and uses of variables in programs.	MAFS.912.A-REI.1.1; MAFS.912.A-SSE.1.1	
19.03 Determine the best data type to use for given programming problems.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.04	Identify the types of operations that can be performed on different data types.	MAFS.912.N-Q.1.1	
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
19.06	Explain how computers store different data types in memory.	MAFS.912.A-REI.1.1	
19.07	Demonstrate the difference between "data" and "information".		
19.08	Use different number systems to represent data.	MAFS.912.N-Q.1.1	
19.09	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.	MAFS.912.A-REI.1.1	
19.10	Use Boolean logic to perform logical operations.		
20.0	Distinguish between iterative and non-iterative program control structures–The student will be able to:		
20.01	Explain non-iterative programming structures (*e.g.*, if, if/else and their uses.	MAFS.912.A-REI.1.1	
20.02	Explain iterative programming structures (*e.g.*, while, do/while) and their uses.	MAFS.912.A-REI.1.1	
21.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:		
21.01	Identify the characteristics, uses, and limits of low-level programming languages.	MAFS.912.N-Q.1.1	
21.02	Identify the characteristics, uses, and limits of high-level programming languages.	MAFS.912.N-Q.1.1	
21.03	Identify the characteristics, uses, and limits of rapid development programming languages.	MAFS.912.N-Q.1.1	
21.04	Describe object-oriented concepts.	MAFS.912.A-REI.1.1	
21.05	Explain the characteristics of procedural and object-oriented programming languages.	MAFS.912.A-REI.1.1	
21.06	Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).	MAFS.912.G-SRT.1.2	
22.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:		
22.01	Describe and explain tools used in software development.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	
22.02	Describe the stages of the program life cycle.	MAFS.912.A-REI.1.1	
22.03	Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).	MAFS.912.G-SRT.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
22.04	List and explain the steps in the program development cycle.	MAFS.912.A-REI.1.1	
22.05	Describe different types of documentation used in the program development cycle (*e.g.*, requirements document, program design documents, test plans).	MAFS.912.N-Q.1.1	
22.06	Describe the on-going need for program maintenance.	MAFS.912.A-REI.1.1	
22.07	Describe different methods companies use to facilitate program updates for enhancements and defects (*e.g.*, how customers receive patches, updates, new versions, upgrades).	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
22.08	Describe different methods used to facilitate version control and change management.	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
23.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:		
23.01	Explain the uses and limits of testing in ensuring program quality.	MAFS.912.A-REI.1.1	SC.912.N.1.1
23.02	Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.1	
23.03	Describe data and the use of test plans/scripts to be used in program testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
23.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
23.05	Identify the data to be used for boundary conditions.	MAFS.912.N-Q.1.1	
23.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	SC.912.N.1.1
24.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:		
24.01	Describe different design methodologies and their uses (*e.g.*, object-oriented design, structured design, and rapid application development).	MAFS.912.A-REI.1.1	SC.912.N.1.1, SC.912.N.3.5
24.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).	MAFS.912.A-REI.1.1	SC.912.N.1.1
24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.	MAFS.912.A-REI.1.1	
24.04	Participate and contribute to a design review of a program design developed using a common program design tool (*e.g.*, UML, flowcharts, design documents, pseudocode).	MAFS.912.A-CED.1.1	SC.912.N.1.1, SC.912.N.1.3, SC.912.N.2.4, SC.912.N.4.2

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	24.05 Write a program design document using UML or other standard design methodology.	MAFS.912.A-CED.1.1	
	24.06 Define input and output for a program module using UML or other standard design methodology.	MAFS.912.F-IF.1.1	
25.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:		
	25.01 Explain the security risks to personal and business computer users.	MAFS.912.S-IC.2.6	
	25.02 Identify different types of threats to computer systems.	MAFS.912.N-Q.1.1	
	25.03 Identify methods to protect against different threats to computer systems.	MAFS.912.N-Q.1.1	
	25.04 Understand the importance of a disaster/emergency response plan.		
	25.05 Identify alternative methods for data storage and backup (*e.g.*, mirroring, fail-over, high availability, types of backups).	MAFS.912.N-Q.1.1	
26.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
	26.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		SC.912.N.1.9, SC.912.N.1.10
	26.02 Locate, organize and reference written information from various sources.		SC.912.N.1.1.6
	26.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	MAFS.912.A-CED.1.1	SC.912.N.1.1.9, SC.912.N.1.1.10
	26.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.	MAFS.912.G-SRT.1.2	SC.912.N.1.1.5, SC.912.N.1.1.6, SC.912.N.1.1.8
	26.05 Apply active listening skills to obtain and clarify information.		
	26.06 Develop and interpret tables and charts to support written and oral communications.	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.1 MAFS.912.F-IF.3.9	SC.912.N.1.1.6-11
	26.07 Exhibit public relations skills that aid in achieving customer satisfaction.		
27.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	27.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.	MAFS.912.G-CO.3.9	SC.912.N.1.1
	27.02 Employ critical thinking and interpersonal skills to resolve conflicts.	MAFS.912.G-CO.3.9	SC.912.N.1.3, SC.912.N.4.1
	27.03 Identify and document workplace performance goals and monitor progress toward	MAFS.912.N-Q.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	those goals.		
27.04	Conduct technical research to gather information necessary for decision-making.	MAFS.912.S-IC.2.6; MAFS.912.S-IC.1.1	SC.912.N.1.3, SC.912.N.1.1.5
28.0	Use information technology tools. – The student will be able to:		
28.01	Use personal information management (PIM) applications to increase workplace efficiency.		
28.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.	MAFS.912.G-CO.4.12	
28.03	Employ computer operations applications to access, create, manage, integrate, and store information.	MAFS.912.Z-CED.1.1	
28.04	Employ collaborative/groupware applications to facilitate group work.		

Florida Department of Education
Student Performance Standards

Course Title: **Procedural Programming**
Course Number: **9007220**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts with a focus on the creation of software applications employing procedural programming techniques. After successful completion of Programming Foundations and Procedural Programming, students will have met Occupational Completion Point B, Computer Programmer Assistant, SOC Code 15-1131.

Florida State Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Application Development & Programming.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida State Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Application Development & Programming.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida State Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0	Methods and strategies for using Florida State Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Web Application Development & Programming.		
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure.	

Florida State Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.7.1	
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.0 Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:		
32.01 Choose appropriate data types depending on the needs of the program.	MAFS.912.N-Q.1.1	
32.02 Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).	MAFS.912.N-Q.1.2	
32.03 Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).	MAFS.912.A-REI.1.1	
32.04 Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).	MAFS.912.N-Q.1.1	
32.05 Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).	MAFS.912.N-Q.1.1	
33.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:		
33.01 Use appropriate naming conventions to define program variables and modules (methods, functions).	MAFS.912.N-Q.1.1	
33.02 Use a program editor to write the source code for a program.	MAFS.912.A-REI.1.1	
33.03 Write programs that use selection structures (*e.g.*, if, if/else).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.04 Write programs that use repetition structures (*e.g.*, while, do/while).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.05 Write programs that use nested structures.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
33.06	Use internal documentation (*e.g.*, single-line and multi-line comments, program headers, module descriptions, meaningful variable and function/module names) to document a program according to accepted standards.		
33.07	Compile and run programs.	MAFS.912.A-REI.1.1	
33.08	Write programs that use standard arithmetic operators with different numerical data types.	MAFS.912.N-Q.1.1; MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2 MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
33.09	Write programs that use standard logic operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.10	Write programs that use a variety of common data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2 MAFS.912.N-Q.1.1, MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
33.11	Write programs that perform data conversion between standard data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.12	Write programs that define, use, search, and sort arrays.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.13	Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
33.14	Demonstrate understanding and use of appropriate variable scope.	MAFS.912.A-REI.1.1	
34.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:		
34.01	Write programs that perform user input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
34.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.03	Write program modules such as functions, subroutines, or methods.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.04	Write program modules that accept arguments.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.05	Write program modules that return values.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.06	Write program modules that validate arguments and return error codes.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.07	Write interactive programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.08	Write programs that use standard libraries to enhance program function.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
34.09	Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.		
35.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:		
35.01	Write a unit test plan that identifies the input data and expected results for program tests.	MAFS.912.A-REI.1.1	SC.912.N.1.1
35.02	Test and debug programs, including programs written by others.	MAFS.912.A-REI.1.1	
35.03	Write a test report that identifies the results of testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
35.04	Trace through the function of a program to ensure valid operation.	MAFS.912.N-Q.1.1	
35.05	Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).	MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	35.06 Create a disaster/emergency response plan for a computer system.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
36.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
	36.01 Employ leadership skills to accomplish organizational goals and objectives.		
	36.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
	36.03 Conduct and participate in meetings to accomplish work tasks.		
37.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
	37.01 Evaluate and justify decisions based on ethical reasoning.	MAFS.912.S-IC.2.6	
	37.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	MAFS.912.S-IC.2.6	
	37.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	MAFS.912.S-IC.2.6; MAFS.912.A-REI.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **Object-Oriented Programming Fundamentals**
Course Number: **9007230**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts with a focus on the creation of software applications employing object-oriented programming techniques. After successful completion of Object-Oriented Programming Fundamentals, students will have met Occupational Completion Point C, Computer Programmer, SOC Code 15-1131.

Florida State Standards			Correlation to CTE Program Standard #
29.0	Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Application Development & Programming.		
29.01	Key Ideas and Details		
	29.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	29.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	29.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
29.02	Craft and Structure		
	29.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	29.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	29.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida State Standards			Correlation to CTE Program Standard #
		LAFS.1112.RST.2.6	
29.03	Integration of Knowledge and Ideas		
	29.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
	29.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
	29.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
29.04	Range of Reading and Level of Text Complexity		
	29.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
	29.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
30.0	Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Application Development & Programming.		
30.01	Text Types and Purposes		
	30.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	30.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
30.02	Production and Distribution of Writing		
	30.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	30.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
	30.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida State Standards			Correlation to CTE Program Standard #
		individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
	30.03	Research to Build and Present Knowledge	
	30.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
	30.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
	30.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	30.04	Range of Writing	
	30.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
31.0	Methods and strategies for using Florida State Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Web Application Development & Programming.		
	31.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	31.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	31.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	31.04	Model with mathematics. MAFS.K12.MP.4.1	
	31.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	31.06	Attend to precision. MAFS.K12.MP.6.1	
	31.07	Look for and make use of structure.	

Florida State Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.7.1	
31.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
38.0 Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:		
38.01 Demonstrate the understanding and use of classes, objects, attributes, and behaviors.	MAFS.912.A-REI.1.1	
38.02 Demonstrate the understanding and use of inheritance.	MAFS.912.A-REI.1.1	
38.03 Demonstrate the understanding and use of data encapsulation.	MAFS.912.A-REI.1.1	
38.04 Demonstrate the understanding and use of polymorphism.	MAFS.912.A-REI.1.1	
39.0 Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements. – The student will be able to:		
39.01 Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.	MAFS.912.A-REI.1.1	
39.02 Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.	MAFS.912.A-REI.1.1	
39.03 Design an object-oriented program using UML or another standard design methodology.	MAFS.912.H-CED.1.1	
39.04 Work with other team members to develop a project plan for a program.	MAFS.912.A-REI.1.1	
39.05 Work with other team members to write a design document for a program with multiple functions and shared data.	MAFS.912.A-REI.1.1	
39.06 Participate in design meetings that review program design documents for conformance to program requirements.	MAFS.912.S.IC.2.6	
39.07 Estimate the time to develop a program or module.	MAFS.912.S.IC.2.6	
40.0 Design, document, and create object-oriented computer programs. – The student will be able to:		
40.01 Compare and contrast recursive functions to other iterative methods.	MAFS.912.G-SRT.1.2	
40.02 Understand the implementation of character strings in the programming language.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
40.03 Write programs that perform string processing (*e.g.*, string manipulation, string compares, concatenation).	MAFS.912.A-REI.1.1	
40.04 Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.05 Write object-oriented programs that use inheritance.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.06 Write object-oriented programs that use polymorphism.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.07 Develop class constructors.	MAFS.912.S-MD.1.3	
40.08 Write programs that define and use program constants.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.09 Write programs that perform error handling.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.10 Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.	MAFS.912.S-IC.2.6	
40.11 Write programs that perform dynamic memory allocation.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.12 Write programs that perform effective management of dynamically allocated memory.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.13 Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal, external) related to version control.	MAFS.912.A-REI.1.1	
40.14 Write programs that use complex data structures (*e.g.*, stacks, queues, trees, linked lists).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
40.15 Write programs that are event-driven.	MAFS.912.A-CED.1.1; MAFS.912.A-	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		CED.1.2	
	40.16 Write programs that perform file input and output (*i.e.*, sequential and random access file input/output).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	40.17 Perform basic database commands including connect, open, select, and close.	MAFS.912.A-REI.1.1	
41.0	Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results. – The student will be able to:		
	41.01 Develop a test plan for an object-oriented program.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.02 Write test plans for event-driven programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.03 Write test plans for programs that perform file input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	41.04 Perform test and debug activities on object-oriented programs, including those written by someone else.	MAFS.912.A-REI.1.1	
	41.05 Perform test and debug activities on an event-driven program.	MAFS.912.A-REI.1.1	
	41.06 Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.	MAFS.912.A-REI.1.1	
	41.07 Document the findings of testing in a test report.	MAFS.912.S-CP.1.4	SC.912.N.1.1

Florida Department of Education
Student Performance Standards

Course Title: **Web Programming**
Course Number: **9007510**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to the Internet and Internet-based software applications.

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
42.0	Demonstrate proficiency using HTML and XHTML to create web content. — The student will be able to:		
42.01	Use storyboarding techniques for designing a Web site (e.g., linear, hierarchical).	MAFS.912.N-Q.1.1	
42.02	Identify elements of a Web page.	MAFS.912.N-Q.1.1	
42.03	Create Web pages using HTML and XHTML tags that create basic elements (e.g., links, lists, formatted text, tables).	MAFS.912.A-CED.1.1	
42.04	Create Web pages that utilize tables to achieve complex layout.	MAFS.912.N-Q.1.1, MAFS.912.A-CED.1.1	
42.05	Add graphic content to Web pages.	MAFS.912.F-IF.2.4	
42.06	Create Web pages that utilize client-side image maps.	MAFS.912.A-CED.1.1	
42.07	Develop, integrate, and apply the use of forms in Web site design.	MAFS.912.A-CED.1.1; MAFS.912.A-REI.1.1	
42.08	Optimize Web content for desirable search engine placement.		
42.09	Demonstrate an understanding of browser compatibility issues by designing pages that comply with the current Web Content Accessibility Guidelines issued by the World Wide Web Consortium (W3C).	MAFS.912.A-REI.1.1	
42.10	Demonstrate an understanding of Web accessibility issues by developing pages that meet Bobby accessibility checker criteria.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
42.11	Explain basic XML syntax and how XHTML conforms to the XML standard.	MAFS.912.A-REI.1.1	
42.12	Use a WYSIWYG editor to develop and manage a Web site.		
42.13	Use markup validation tools to test HTML and XHTML documents for well-formed elements and make all corrections necessary to ensure compliance with W3C standards.	MAFS.912.G-CO.4.12	
42.14	Analyze and modify HTML and XHTML source code developed by others.	MAFS.912.S-MD.2.7	
43.0	Demonstrate proficiency using cascading style sheets (CSS) to format web pages. – The student will be able to:		
43.01	Explain the advantages and disadvantages of using Cascading Style Sheets (CSS) to format Web pages.	MAFS.912.G-SRT.1.2; MAFS.912.A-REI.1.1	
43.02	Describe the difference between linked, embedded, imported and inline styles and explain how styles are inherited.	MAFS.912.G-SRT.1.2; MAFS.912.A-REI.1.1	
43.03	Explain the difference between classes, id, and span elements.	MAFS.912.G-SRT.1.2; MAFS.912.A-REI.1.1	
43.04	Utilize CSS properties within Web pages to control page layout, fonts, colors, backgrounds, and other presentation effects.		
43.05	Demonstrate understanding of the Box Model.	MAFS.912.A-REI.1.1	
43.06	Demonstrate proficiency in creating 1 to 3 column layouts.	MAFS.912.A-REI.1.1	
43.07	Create navigation system through CSS.	MAFS.912.A-CED.1.1	
44.0	Demonstrate proficiency using basic client-side scripting to control the content and the behavior of HTML and XHTML documents. – The student will be able to:		
44.01	Describe the difference between server-side and client-side processing.	MAFS.912.G-SRT.1.2; MAFS.912.A-REI.1.1	
44.02	Describe the term “scripting language” and explain how scripting languages differ from compiled languages.	MAFS.912.G-SRT.1.2; MAFS.912.A-REI.1.1	
44.03	Create web pages that employ client-side scripting to control content and display.	MAFS.912.A-CED.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **JavaScript Programming**
Course Number: **9007520**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to client-side JavaScript.

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
45.0	Demonstrate an understanding of JavaScript programming fundamentals. – The student will be able to:		
45.01	Describe server side versus client side applications including interpreters.	MAFS.912.A-REI.1.1	
45.02	Describe the purpose and use of an interpreter in relation to JavaScript.	MAFS.912.A-REI.1.1	
45.03	Describe differences in different types of JavaScript implementations (i.e., Jscript, ECMA).	MAFS.912.A-REI.1.1	
45.04	Declare and initialize variables.	MAFS.912.A-CED.1.2	
45.05	Assign new values to variables.	MAFS.912.A-CED.1.2	
45.06	Create and use constant variables.	MAFS.912.A-CED.1.2	
45.07	Describe the difference of programming languages versus scripting languages.	MAFS.912.A-REI.1.1	
45.08	Describe object based nature and platform independence.	MAFS.912.A-REI.1.1	
45.09	Describe and demonstrate inline scripting.	MAFS.912.A-REI.1.1	
46.0	Demonstrate proficiency in assigning and handling variables in JavaScript programs and functions. – The student will be able to:		
46.01	Describe how variables are used in programs.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
46.02	Identify which data type should be used for a given value.	MAFS.912.N-Q.1.1	
46.03	Identify the syntax for using variables.	MAFS.912.N-Q.1.1	
46.04	Declare and initialize variables.	MAFS.912.A-CED.1.2	
46.05	Assign new values to variables.	MAFS.912.A-CED.1.2	
46.06	Create and use constant variables.	MAFS.912.A-CED.1.2	
46.07	Describe and demonstrate the use of properties.	MAFS.912.A-REI.1.1	
46.08	Describe identifiers and identify valid and invalid identifiers.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
46.09	Describe and identify reserved words, delimiters, literals, and comments.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
47.0	Use event handlers in JavaScript programs and functions. – The student will be able to:		
47.01	Describe the event model and five events (form, image, map, link, and window).	MAFS.912.A-REI.1.1	
47.02	Demonstrate and use the window events load, focus, blur, and unload.	MAFS.912.A-REI.1.1	
47.03	Demonstrate and use the form events change, reset, and submit.	MAFS.912.A-REI.1.1	
47.04	Demonstrate and use the text events cut, paste, select, and copy.	MAFS.912.A-REI.1.1	
47.05	Demonstrate and use the mouse events mousemove, mousedown, click, mousewheel,mouseover, mouseout and mouseover.	MAFS.912.A-REI.1.1	
47.06	Demonstrate and use the keyboard events keyup, keydown and keypress.	MAFS.912.A-REI.1.1	
47.07	Demonstrate using the appropriate event handlers with their associated events.	MAFS.912.A-REI.1.1	
48.0	Recognize and assign data types appropriate to their use. – The student will be able to:		
48.01	Describe the data type categories.	MAFS.912.A-REI.1.1	
48.02	Give examples of var, primitives, null, and undefined data types.	MAFS.912.N-Q.1.1	
48.03	Demonstrate the use of var in relation to other datatypes.	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.2	
49.0	Demonstrate proficiency is using appropriate operators to achieve a planned output. – The student will be able to:	MAFS.912.F-BF.1.2	
49.01	Construct statements using arithmetic operators.	MAFS.912.A-APR.1.1; MAFS.912.N.CN.3.7	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
49.02 Construct statements using relational operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.3	
49.03 Construct and use statements using logical operators.	MAFS.912.S-CP.1.4	
49.04 Construct and use statements using string concatenation, and strict comparison.	MAFS.912.S-CP.1.1	
49.05 Construct and use statements using assignment operators.	MAFS.912.A-CED.1.4	
49.06 Construct and execute statements using operator precedence.	MAFS.912.A-APR.4.7	
50.0 Write executable statements. – The student will be able to:		
50.01 Construct variable assignment statements.	MAFS.912.A-CED.1.2	
50.02 Construct statements using built-in functions.	MAFS.912.F-BF.1.1	
50.03 Describe when implicit data type conversions take place.	MAFS.912.A-REI.1.1	
50.04 List the drawbacks of implicit data type conversions.	MAFS.912.A-REI.1.1	
50.05 Construct statements using functions to explicitly convert data types.	MAFS.912.F-BF.1.1	
51.0 Demonstrate an understanding of variable scope. – The student will be able to:		
51.01 Understand the scope and visibility of variables.	MAFS.912.A-CED.1.2	
51.02 Write programs using local variables.	MAFS.912.A-REI.1.1	
51.03 Describe the scope of a variable.	MAFS.912.A-REI.1.1	
52.0 Use good programming practices. – The student will be able to:		
52.01 List examples of good programming practices.	MAFS.912.A-REI.1.1	
52.02 Insert comments into code.	MAFS.912.A-REI.1.1	
52.03 Demonstrate the use of <no script> tag.	MAFS.912.A-REI.1.1	
52.04 Follow formatting guidelines when writing code.	MAFS.912.N-Q.1.1	
52.05 Understand the different types of errors produced by programs.	MAFS.912.A-REI.1.1	
53.0 Demonstrate use of the Document Object Module (DOM. – The student will be able to:		
53.01 Create and use user defined objects.	MAFS.912.A-CED.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	53.02 Create user defined objects with properties and methods.	MAFS.912.A-CED.1.2	
	53.03 Describe and Use the Array Object including its parameters, properties, and methods (chop, join, pop, push, splice, split).	MAFS.912.A-REI.1.1	
	53.04 Describe and Use the Date Object including its multiple constructors, properties, and methods (getDay, getMonth, getYear, getMinutes, getHous, getTime).	MAFS.912.A-REI.1.1	
	53.05 Describe and use the Window Object including \properties, and methods.	MAFS.912.A-REI.1.1	
	53.06 Describe and use the Image Object including its properties, and methods.	MAFS.912.A-REI.1.1	
	53.07 Describe and use the History Object including its properties, and methods.	MAFS.912.A-REI.1.1	
	53.08 Describe and use the RegEx Object for basic and complex regular expressions.	MAFS.912.A-REI.1.1	
	53.09 Describe and use the String Object including its properties, and methods.	MAFS.912.A-REI.1.1	
	53.10 Describe and use the Math Object including its properties, and methods.	MAFS.912.A-REI.1.1	
54.0	Use conditional control statements in JavaScript. – The student will be able to:		
	54.01 Construct and use an if statement.	MAFS.912.S-CP.1.1	
	54.02 Construct and use a switch statement.	MAFS.912.S-CP.1.1	
	54.03 Construct and use a while, do while, and for loop.	MAFS.912.S-CP.1.1	
	54.04 Construct and use a conditional operator.	MAFS.912.S-CP.1.1	
55.0	Use iterative control statements in JavaScript. – The student will be able to:		
	55.01 Describe the types of loop statements and their uses.	MAFS.912.A-REI.1.1	
	55.02 Construct and use the while and do while loop.	MAFS.912.F-BF.1.2	
	55.03 Construct and use the for loop.	MAFS.912.F-BF.1.2	
	55.04 Describe when a while loop is used.	MAFS.912.A-REI.1.1	
	55.05 Describe when a for loop is used.	MAFS.912.A-REI.1.1	
56.0	Use nested loop iterative control statements in JavaScript. – The student will be able to:		
	41.01 Construct and execute a program using nested loops.	MAFS.912.F-BF.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	41.02 Construct and execute a loop using break and continue.	MAFS.912.F-BF.1.2	
	41.03 Evaluate a nested loop construct and sentinel value.	MAFS.912.S-IC.2.6	
57.0	Use JavaScript to produce input and output for programs. – The student will be able to:		
	57.01 Describe and use the prompt() and confirm() to input data into programs.	MAFS.912.A-REI.1.1	
	57.02 Describe and demonstrate the use of the alert() to produce output to the console.	MAFS.912.A-REI.1.1	
	57.03 Describe and demonstrate how to input data using JavaScript Events.	MAFS.912.A-REI.1.1	
	57.04 Describe and demonstrate how to output using the document.write().	MAFS.912.A-REI.1.1	
	57.05 Explain the difference of prompt() and confirm() functions.	MAFS.912.A-REI.1.1	
	57.06 Create and use escape sequences.		
58.0	Demonstrate proficiency in using Form Objects in JavaScript programs and functions. – The student will be able to:		
	58.01 Use Form objects to validate input.		
	58.02 Access the value of the form object through its associated method.	MAFS.912.N-Q.1.1	
	58.03 Describe and use button, checkbox, textarea, select, radio, hidden, and text objects.	MAFS.912.A-REI.1.1	
	58.04 Access and modify values and attributes at runtime using getElementbyId, getElementsbyName, getElementsbyTagName, and inner HTML.		
59.0	Demonstrate proficiency in using methods in JavaScript programs and functions. – The student will be able to:		
	59.01 Differentiate between anonymous methods and methods.	MAFS.912.N-Q.1.1	
	59.02 Identify the benefits of using methods.	MAFS.912.N-Q.1.1	
	59.03 Describe and use inner method.	MAFS.912.A-REI.1.1	
	59.04 Create a method.	MAFS.912.F-BF.1.2	
	59.05 Describe how a method is invoked.	MAFS.912.A-REI.1.1	
60.0	Demonstrate proficiency in using parameters in JavaScript programs and functions. – The student will be able to:		
	60.01 Describe how parameters are passed into functions.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
60.02 Define a parameter.	MAFS.912.A-REI.1.1	
60.03 Create a method using a parameter.	MAFS.912.F-BF.1.2	
60.04 Invoke a method that has parameters.	MAFS.912.F-BF.1.2	
60.05 Distinguish between formal and actual parameters.	MAFS.912.A-REI.1.1	
61.0 Utilize debugging techniques in programs. – The student will be able to:		
61.01 Use the display property to enable/disable code blocks.		
61.02 Use document.write() to log program execution.	MAFS.912.A-REI.1.1	
61.03 Test program in different browsers and mobile devices for compatibility errors.	MAFS.912.S-IC.2.6	
61.04 Use comments as a flow control while debugging.	MAFS.912.N-Q.1.1	
62.0 Recognize security risks in programs. – The student will be able to:		
62.01 Describe the security risk of cookies and browsers.	MAFS.912.A-REI.1.1	
62.02 Identify security responsibilities of browsers and operating system.	MAFS.912.N-Q.1.1	
62.03 Describe security systems such as frame to frame URL changing.	MAFS.912.A-REI.1.1	
62.04 Describe the use of signed scripts.	MAFS.912.A-REI.1.1	
62.05 Create and use cookies in a secure manner.	MAFS.912.A-REI.1.1	
63.0 Use plug-ins and libraries. – The student will be able to:		
63.01 Use external libraries in the program.	MAFS.912.N-Q.1.1	
63.02 Describe and contrast the following industry libraries JQuerry, Dojo, LightBox, and Moo Tools, PhoneGap.	MAFS.912.A-REI.1.1	
63.03 Describe different types of libraries full, effects, tools, graphing, math, cryptography, and AJAX.	MAFS.912.A-REI.1.1	
63.04 Identify how load and reference external and user made scripts.	MAFS.912.N-Q.1.1	
63.05 Describe AJAX elements and procedures.	MAFS.912.A-REI.1.1	
63.06 Describe XML.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	63.07 Demonstrate the use of XMLHttpRequest to retrieve data.	MAFS.912.A-REI.1.1	
64.0	Demonstrate proficiency in programming for mobile delivery technology (e.g., iPhone/Android). – The student will be able to:		
	64.01 Respond to multi-touch and gesture events.	MAFS.912.A-REI.1.1	
	64.02 Describe and demonstrate the use of webkit CSS.	MAFS.912.A-REI.1.1	
	64.03 Use the meta tag to enable native look and feel.		
	64.04 Create a splash screen.		
	64.05 Describe and demonstrate app caching.	MAFS.912.A-REI.1.1	
	64.06 Describe and demonstrate use of JQuery for mobile development.	MAFS.912.A-REI.1.1	
	64.07 Describe how to publish the app using XCode.	MAFS.912.A-REI.1.1	

Florida Department of Education
Student Performance Standards

Course Title: **PHP Programming**
Course Number: **9007530**
Course Credit: **1**

Course Description:

This course continues the study of computer programming concepts specific to PHP programming.

Abbreviations:
FS-M/LA = Florida State Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
65.0 Demonstrate an understanding of Personal Home Page (PHP) programming language. – The student will be able to:		
65.01 Describe the evolution of PHP as a programming language.	MAFS.912.A-REI.1.1	
65.02 Discuss the strengths and limitations of PHP.		
66.0 Demonstrate proficiency in PHP configuration. – The student will be able to:		
66.01 Set up a PHP host (wamp, mamp, online).	MAFS.912.A-CED.1.1	
66.02 Configure PHP for File Transfer Protocol (FTP) access.	MAFS.912.N-Q.1.1	
66.03 Configure the config.php file.	MAFS.912.N-Q.1.1	
67.0 Demonstrate an understanding of PHP language basics. – The student will be able to:		
67.01 Describe how variables are declared, referenced, and passed.	MAFS.912.A-REI.1.1	
67.02 Describe the control structures inherent with PHP programming.	MAFS.912.A-REI.1.1	
67.03 Describe the three types of arrays used in PHP.	MAFS.912.A-REI.1.1	
67.04 Describe how functions in PHP are created, called, and controlled.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
68.0	Demonstrate proficiency in the use of server processes. – The student will be able to:		
68.01	Describe a session and explain its importance and use in web programming.	MAFS.912.A-REI.1.1	
68.02	Describe the server processes associated with forms handling.	MAFS.912.A-REI.1.1	
68.03	Compare and contrast the use of GET and POST.	MAFS.912.G-SRT.1.2	
68.04	Describe cookies and explain their use, population, control, and risks.	MAFS.912.A-REI.1.1	
68.05	Describe HTTP Headers and their role in web development.	MAFS.912.A-REI.1.1	
68.06	Describe HTTP Authentication.	MAFS.912.A-REI.1.1	
69.0	Demonstrate an understanding of object-oriented programming in PHP. – The student will be able to:		
69.01	Create classes using PHP.	MAFS.912.A-CED.1.1	
69.02	Describe inheritance and its role in PHP programming.	MAFS.912.A-REI.1.1	
69.03	Write PHP code to handle exceptions.	MAFS.912.A-REI.1.1	
69.04	Write PHP code to accommodate different interfaces.	MAFS.912.A-REI.1.1	
70.0	Demonstrate proficiency in writing PHP code to handle file input/output (I/O) operations. – The student will be able to:		
70.01	Write PHP code to perform open, read, and write operations on files.	MAFS.912.A-REI.1.1	
70.02	Write PHP code to initiate file system functions.	MAFS.912.A-REI.1.1	
70.03	Write PHP code to handle streams.	MAFS.912.A-REI.1.1	
71.0	Demonstrate proficiency in creating, populating, and using arrays in PHP. – The student will be able to:		
71.01	Create, populate and write code to extract information from a numeric array in PHP.	MAFS.912.A-CED.1.1	
71.02	Create, populate and write code to extract information from an associative array in PHP.	MAFS.912.A-CED.1.1	
71.03	Create, populate and write code to extract information from a multidimensional array in PHP.	MAFS.912.A-CED.1.1	
72.0	Demonstrate proficiency handling strings in PHP. – The student will be able to:		
72.01	Write PHP code to retrieve or extract one or more characters from a string.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	72.02 Write PHP code to convert a string from data type to another.	MAFS.912.A-REI.1.1	
	72.03 Write PHP code to manipulate the display characteristics of string data.	MAFS.912.A-REI.1.1	
	72.04 Write PHP code that uses string date to control program flow.	MAFS.912.A-REI.1.1	
	72.05 Write PHP code to join array elements with a string.	MAFS.912.A-REI.1.1	
73.0	Demonstrate proficiency in using PHP to access databases via Open Database Connectivity (ODBC). – The student will be able to:		
	73.01 Write PHP code to create an ODBC connection and retrieve information from a database using the appropriate Structured Query Language (SQL) statement.	MAFS.912.A-REI.1.1	
	73.02 Describe a prepared statement and discuss its primary advantages (e.g., code efficiency, SQL Injection prevention).	MAFS.912.A-REI.1.1	
	73.03 Create a prepared statement to perform specific SQL actions.	MAFS.912.A-CED.1.1	
	73.04 Describe a PHP Data Object (PDO) transaction and explain its primary advantages.	MAFS.912.A-REI.1.1	
	73.05 Create a prepared statement and associated result set using PDOStatement.	MAFS.912.A-CED.1.1	
74.0	Demonstrate proficiency in applying best practices for ensuring creation of a secure program. – The student will be able to:		
	74.01 Describe an SQL Injection, its consequences, and ways in which it may be prevented via programming.	MAFS.912.A-REI.1.1	
	74.02 Describe the Remote Code Injection vulnerability in PHP and ways in which it may be prevented.	MAFS.912.A-REI.1.1	
	74.03 Describe the risk of session hijacking in PHP and ways to program around it.	MAFS.912.A-REI.1.1	
	74.04 Describe the risks associated with uploading files in PHP and ways in which risks might be mitigated.	MAFS.912.A-REI.1.1	
	74.05 Describe Secure Sockets Layer (SSL) and usage issues related to PHP.	MAFS.912.A-REI.1.1	
75.0	Demonstrate an understanding of key technologies, protocols, and architectures associated with web development and programming. – The student will be able to:		
	75.01 SimpleXML functions.		
	75.02 Extensible Markup Language (XML) Extension.		
	75.03 XML Path Language (Xpath).		
	75.04 Web Services.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
75.05 Simple Object Access Protocol (SOAP).		
75.06 Representational State Transfer (REST).		
75.07 JavaScript Object Notation (JSON).		
75.08 Asynchronous JavaScript and XML (AJAX).		

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different

competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Information Technology Administration**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511010307
Program Type	College Credit Certificate (CCC)
Program Length	18 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	11-3021 – Computer and Information Systems Managers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Internet Services Technology AS degree program (1511080102).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to Internet, Intranet, and Extranet environments; installing and configuring Intranet and web-based resources.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency with Internet structure, organization, and navigation.
02.0 Demonstrate understanding of networked environments, hardware and software.
03.0 Understand, install and configure computer hardware.
04.0 Understand, install and configure computer software.
05.0 Perform web design/development activities.
06.0 Perform web site management activities.
07.0 Perform e-commerce-related tasks.

Florida Department of Education
Student Performance Standards

Program Title: **Information Technology Administration**
CIP Number: **0511010307**
Program Length: **18 credit hours**
SOC Code(s): **11-3021**

This certificate program is part of the Internet Services Technology AS degree program (1511080102). At the completion of this program, the student will be able to:
01.0 Demonstrate proficiency with internet structure, organization, and navigation. – The student will be able to:
01.01 Describe the origin of the Internet.
01.02 Outline the history of the Internet.
01.03 Describe Internet organization, such as the Internic, domains and requests for comments (RFCs).
01.04 Describe the structure of the Internet.
01.05 Differentiate between the Internet and the WWW.
01.06 Define Internet push technologies, such as email marketing vs. Web page banner advertising.
01.07 Differentiate among an Intranet site, an extranet site, and an Internet site.
01.08 Characterize the role of the Internet in today's society.
01.09 Describe several major ethical issues related to Internet use.
01.10 Identify several legal issues related to Internet use.
01.11 Identify several examples to show how the Internet has affected intellectual property rights.
01.12 Identify several examples to show how the Internet has affected personal security and privacy.
01.13 Describe the World Wide Web (WWW).
01.14 Provide several examples to show how the WWW has affected our society.
01.15 Demonstrate the use of typical file types and protocols (http:, ftp:, mailto:, gopher:, telnet:).
01.16 Demonstrate the use of typical remote access mechanisms.

01.17	Differentiate among all valid WWW file types.
01.18	Differentiate among all WWW multimedia file types.
01.19	Describe components of URL and their meanings (including types).
01.20	Effectively use Internet tools and utilities such as e-mail, browsers, search engines, news groups, list serves, chat rooms, file transfers.
01.21	Install and configure an Internet browser.
01.22	Install and configure browser add-ons and plug-ins.
01.23	Install and configure a newsgroup reader.
01.24	Install and configure a chat group client.
02.0	Demonstrate understanding of networked environments, hardware, and software. – The student will be able to:
02.01	Give several advantages and disadvantages of networked and non-networked environments.
02.02	Describe current network environments, such as peer-to-peer and client/server.
02.03	Identify and discuss issues (such as security, privacy, redundancy) related to networked environments.
02.04	Identify and discuss issues related to naming conventions for user-ids, e-mail, passwords, and network devices.
02.05	List and define layers in the OSI and TCP/IP network protocol models.
02.06	Identify and describe current relevant IEEE network standards.
02.07	Illustrate typical network topologies.
02.08	Identify advantages and disadvantages of each topology.
02.09	Describe the major functions of LAN hardware protocols such as Ethernet, token ring, FDDI, and arcnet.
02.10	Describe LAN software protocols such as IPX/SPX, TCP/IP, and NetBEUI.
02.11	Discuss the nature of IP addresses and MAC addresses, and mapping between protocol addressing schemes.
02.12	Describe the major functions of network server hardware and software components.
02.13	Describe server hardware requirements.
02.14	Describe the hardware needed for hosting a Web site.
02.15	Identify a variety of specialized servers (e.g. proxy, e-mail, DHCP, Web).

02.16	Describe the hardware requirements for specialized servers such as -mail, database.
02.17	Describe the major functions of network client hardware components.
02.18	Describe client hardware requirements.
02.19	Differentiate between hardware used to implement different topologies such as token ring and Ethernet.
02.20	Recognize and describe current cable technologies such as twisted-pair, coaxial, and fiber optic, and identifying issues associated with plenum verses non-plenum cable plants.
02.21	Describe current wireless technologies such as satellite, microwave, spread spectrum RF, and infrared.
02.22	Identify advantages and disadvantages of wireless and cable technologies.
02.23	Cite appropriate uses of wireless and cable technologies.
02.24	Describe the major functions of network connectivity hardware, such as hubs, repeaters, bridges, routers, switches, and gateways.
02.25	Describe the hardware needed to connect a LAN to the Internet.
02.26	Describe the function of network storage devices and other peripherals (e.g., RAID, CD towers, printers, fax machines, scanners, printer/fax/copiers, imaging devices, and document center equipment).
02.27	Compare and contrast major functions and features of current network operating systems (including directory services).
02.28	Differentiate between telecommunications and data communications.
02.29	Compare and contrast digital communications lines and cable characteristics (e.g., ISDN, DSL, T-1 and T-3).
03.0	Understand, install and configure computer hardware. – The student will be able to:
03.01	Explain the use of binary numbers to represent instructions and data.
03.02	Describe the hardware implications of the use of binary representation of instructions and data.
03.03	Convert numbers among decimal, binary, and hexadecimal representation.
03.04	Perform binary arithmetic.
03.05	Identify various coding schemes (ASCII).
03.06	Discuss various data types (signed and unsigned integers, floating point).
03.07	Identify the major hardware platforms.
03.08	Describe distinguishing features of the major hardware platforms.
03.09	Describe the functions of major hardware components of a computer system.

03.10	Recognize and correctly identify computing hardware components.
03.11	Describe emerging hardware technologies and discuss their potential impact.
03.12	Implement proper procedures for handling and safeguarding equipment.
03.13	Perform preventive maintenance tasks on microcomputer systems.
03.14	Describe procedures for proper disposal of computer components.
03.15	Set up and configure systems and peripherals.
03.16	Set up BIOS.
03.17	Install and configure storage and I/O device interfaces.
03.18	Install and configure multimedia devices and interfaces.
03.19	Install and configure network interface cards.
04.0	Understand, install and configure computer software. – The student will be able to:
04.01	Describe the functions and major components (BIOS, task management) of a computer operating system.
04.02	Identify current operating systems and describe their important features.
04.03	Use an operating system for activities such as data and file management.
04.04	Identify current systems utilities and describe their functions.
04.05	Use system software to perform routine maintenance tasks such as backup, hard drive defragmentation.
04.06	Use operating systems of different brands and platforms.
04.07	Use both stand-alone operating systems and network operating systems.
04.08	Create, use, and maintain system configuration files.
04.09	Describe the major features and functions of the major categories of applications software (e.g., word processing, database, spreadsheet, presentation, e-mail, browsers).
04.10	Use basic features of office productivity software.
04.11	Learn to perform independently (previously untaught) tasks using office productivity software.
04.12	Use software produced by multiple vendors.
04.13	Transmit and exchange data in a multiple vendor software environment.

04.14	Install and configure a microcomputer operating system.
04.15	Describe procedures for uninstalling operating system software.
04.16	Install and configure system software.
04.17	Install and configure applications software.
04.18	Configure software for accessibility by disabled individuals.
04.19	Install and configure applications software upgrades.
04.20	Describe modifications necessary to an operating system (such as modifying parameters, how to handle conflicting interrupts) when installing, configuring and upgrading typical applications software.
04.21	Install and configure client software for connecting to LANs, WANs, and the Internet (e.g., network client, WWW browser, terminal emulation, file transfer).
04.22	Install and configure client software for client/server and network-based applications (e.g., email, videoconferencing, database).
04.23	Install internetworking applications on a server and configure clients for network access.
04.24	Describe the major functions of network client software components.
04.25	Install and configure client software on multiple hardware platforms.
04.26	Install and configure drivers for NICs and network peripherals (including printers).
04.27	Configure the client to support multiple protocols.
04.28	Install and configure client/server applications such as email, scheduling on a server.
04.29	Install and configure network-based services such as videoconferencing, integrated voicemail/email/fax, large document storage and retrieval.
05.0	Perform web design/development activities. – The student will be able to:
05.01	Create a Web database interface.
05.02	Discuss the issue of ODBC compliance.
06.0	Perform web site management activities. – The student will be able to:
06.01	Describe the process of obtaining an Internet domain address.
06.02	Register an Internet site.
06.03	Notify appropriate external search engines of the Web site.
06.04	Compare features of currently available site management tools.

06.05	Install and configure Web site management software.
06.06	Create and maintain a Web site using a Web management tool.
06.07	Implement appropriate Web site security measures.
06.08	Use and evaluate the results of a Web site visit-recording tool.
07.0	Perform e-commerce-related tasks. – The student will be able to:
07.01	Describe Web e-commerce.
07.02	Analyze e-commerce models.
07.03	Develop an e-commerce business plan.
07.04	Develop e-commerce marketing plan.
07.05	Identify components and procedures necessary to process credit card transactions.
07.06	Integrate credit card transaction process.
07.07	Implement shopping cart software.
07.08	Set up and configure online catalog to market products.
07.09	Establish transaction storage and reporting system.
07.10	Publish web site.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Mobile Device Technology**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511010309
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1121 – Computer Systems Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Computer Information Technology AS or AAS degree program (1511010307).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction on mobile device security and managing mobile devices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Configure, manage and troubleshoot Windows client mobile features including configuring mobile devices, power management, disk encryption, wireless networking, VPN and remote access.
02.0 Configure, enable, manage and troubleshoot VPN, mobile and remote access.

Florida Department of Education
Student Performance Standards

Program Title: **Mobile Device Technology**
CIP Number: **CIP 0511010309**
Program Length: **24 credit hours**
SOC Code(s): **15-1151, 15-1121**

This certificate program is part of the Computer Information Technology AS or AAS degree program (1511010307). At the completion of this program, the student will be able to:	
01.0	Configure, manage and troubleshoot Windows client mobile features including configuring mobile devices, power management, disk encryption, wireless networking, VPN and remote access.
01.01	Describe mobile device technology.
01.02	Identify the security measures required for securing mobile devices.
01.03	Identify mobile device operating systems.
01.04	Distinguish between mobile device operating systems.
01.05	Setup and configure mobile devices.
01.06	Explain the basic differences between mobile devices and how they affect good application design.
01.07	Explain the differences between smart phones, tablets, phablets as it relates to good mobile app design.
02.0	Configure, enable, manage and troubleshoot VPN, mobile and remote access.
02.01	Identify threats associated with VPN, mobile and remote access.
02.02	Identify the safety control of remote access.
02.03	Distinguish between safety countermeasures related to remote access.
02.04	Setup and configure VPN, mobile and remote access.
02.05	Troubleshoot technical problems with VPN, mobile and remote access.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Information Technology Support Specialist**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511010311
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 18 credit hours; Secondary: 28 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Computer Information Technology AS degree program (1511010307).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate how to use current productivity software applications including word processing, spreadsheets, database, presentation software, email, and internet browser applications.
02.0 Install, configure and troubleshoot system and device driver software and implement basic security measures.
03.0 Install, configure, use, manage, and troubleshoot microcomputer operating systems.
04.0 Demonstrate proficiency in supporting Windows-based client and network computer systems.
05.0 Demonstrate proficiency in installing, configuring, deploying, and supporting desktop applications.
06.0 Demonstrate proficiency in supporting Windows users.
07.0 Perform help desk support activities.

Florida Department of Education
Student Performance Standards

Program Title: **Information Technology Support Specialist**
CIP Number: **0511010311**
Program Length: **Primary: 18 credit hours; Secondary: 28 credit hours**
SOC Code(s): **15-1151**

This certificate program is part of the Computer Information Technology AS degree program (0511010307). At the completion of this program, the student will be able to:	
01.0	Demonstrate how to use current productivity software applications including word processing, spreadsheets, database, presentation software, email, and internet browser applications. – The student will be able to:
01.01	Describe the common user interfaces of electronic devices.
01.02	Identify common types of application software and their uses.
01.03	Define and describe the components of a typical operating system interface.
01.04	Create, name, rename, copy, move, backup and delete files, folders and subfolders.
01.05	Create, save, edit and print a document file.
01.06	Format text, paragraphs, and documents.
01.07	Insert, and modify graphic objects, pictures and images.
01.08	Locate and identify the components of a worksheet.
01.09	Enter data on a spreadsheet and use formulas to perform calculations.
01.10	Use built-in arithmetic, statistical, and logic functions on tabular data.
01.11	Format spreadsheets using various formatting techniques.
01.12	Create charts and graphs.
01.13	Select a design template and apply it to a presentation.
01.14	Add text, pictures, objects, and multimedia elements to a slide.
01.15	Insert, delete, copy, and move slides.
01.16	Format and edit a presentation using the outline view and the slides pane view.
01.17	Present a slide show.

	01.18	Distinguish between appropriate and inappropriate use of technology in a professional or academic setting.
	01.19	Distinguish between legal and illegal file-sharing practices in a network and the Internet.
	01.20	Identify the ways in which a virus can infect electronic devices.
	01.21	Describe common threats to the security of electronic devices.
	01.22	Use a website address and a web-browser to navigate to a specific website.
	01.23	Use an internet search engine to find a website on a specific topic.
	01.24	Save a web-address as a “favorite” or “bookmark” for later reference.
	01.25	Create, send, and forward an email message with a file attachment to individuals and to multiple recipients.
02.0	Install, configure and troubleshoot system and device driver software and implement basic security measures. – The student will be able to:	
	02.01	Describe the various types of device drivers used by operating systems and the utilities used to install, configure, manage, upgrade and troubleshoot system devices.
	02.02	Describe the device and driver installation process.
	02.03	Identify, install, configure and troubleshoot device drivers.
	02.04	Verify digital signatures of device drivers.
	02.05	Configure driver policies.
	02.06	Describe the security tools and features in operating systems and how to access them to perform a security audit and update.
	02.07	Install, configure and monitor firewalls to block dangerous incoming and outgoing network traffic.
	02.08	Install, configure and monitor anti-virus software.
	02.09	Perform anti-virus and other security scanning activities to prevent the infiltration of spyware and other malicious software.
	02.10	Install, configure and monitor updates and perform system audits.
	02.11	Perform preventative maintenance and activity monitoring for computer and network security.
03.0	Install, configure, use, manage, and troubleshoot microcomputer operating system. – The student will be able to:	
	03.01	Identify the fundamental principles of operating systems.
	03.02	Describe the general features and uses of current operating systems.
	03.03	Compare and contrast features of popular operating systems.

	03.04	Identify the names, locations, purposes, and contents of major operating system files.
	03.05	Use command line functions and utilities to manage the operating system, including the proper syntax and switches.
	03.06	Create, view, and manage disks, directories and files, and change file attributes.
	03.07	Identify the major operating system utilities, their purpose, location, and options.
	03.08	Install major operating systems and bring the operating system to a basic operational level.
	03.09	Perform operating system upgrades.
	03.10	Create an emergency boot disk with utilities utilizing basic system boot sequences and boot methods.
	03.11	Optimize the operating system and major operating system subsystems.
	03.12	Distinguish and interpret the meaning of common error codes and startup messages from the boot sequence and identify steps to correct the problems.
	03.13	Recognize when to use common diagnostic utilities and tools.
	03.14	Select and use system utilities and tools to diagnose, troubleshoot and resolve operating system problems.
	03.15	Detect and resolve common operational and usability problems.
	03.16	Discuss the network protocols used by operating systems.
	03.17	Explain the networking features of operating systems.
	03.18	Configure operating systems to connect to a local area network.
	03.19	Establish Internet connectivity.
	03.20	Configure operating systems to connect to and use Internet resources.
	03.21	Diagnose and troubleshoot basic network and internet connectivity problems.
04.0	Demonstrate proficiency in supporting Windows-based client and network computer systems. – The student will be able to:	
	04.01	Describe the features and characteristics of a well-deployed and operational client computer in a Windows networked environment.
	04.02	Perform baseline measurements, perform security and performance audits on a client computer, and document findings.
	04.03	Describe the methods of establishing, configuring and controlling group policies.
	04.04	Configure and troubleshoot group policy settings for client computers in a Windows domain.
	04.05	Configure, manage and troubleshoot task scheduler, event forwarding and monitoring tools on a Windows client computer.

	04.06	Test, configure and schedule Windows updates, patches and service packs prior to and after network-wide deployment.
	04.07	Troubleshoot Windows performance, reliability, and security issues.
	04.08	Configure, manage, maintain and troubleshoot Windows security issues, including adding trusted sites, installing secure plug-ins, identifying group policy restrictions, obtaining certificates, analyzing services and programs.
	04.09	Install, manage and maintain anti-malicious software, firewalls and access control.
	04.10	Configure, troubleshoot and secure network protocols and services for Windows client computers.
	04.11	Configure, enable, manage and troubleshoot VPN, mobile and remote access.
	04.12	Troubleshoot, resolve and document network issues, including wired and wireless connectivity, name resolution issues, IP Address conflicts, routing problems, security breaches, domain issues and group policy problems.
	04.13	Determine whether problems are a result of hardware issues, Windows issues, application failures, user errors or other reasons.
	04.14	Monitor events in an enterprise network and log incidents.
05.0	Demonstrate proficiency in installing, configuring, deploying, and supporting desktop applications. – The student will be able to:	
	05.01	Perform advanced office application functions using word processing, spreadsheet, database, presentation, email, and web applications.
	05.02	Test functionality and compatibility of desktop applications and updates with Windows operating system and the intended enterprise use.
	05.03	Demonstrate the common steps to install desktop applications.
	05.04	Configure, deploy and troubleshoot enterprise applications in a networked environment.
	05.05	Administer software license policies, including management of licenses and licensing restrictions, digital signing, and auditing.
	05.06	Perform support functions for deployed applications.
	05.07	Troubleshoot and resolve issues desktop application issues.
	05.08	Describe how product standards in the IT field emerged.
	05.09	Identify methods for evaluation and selection of products.
06.0	Demonstrate proficiency in supporting Windows users. – The student will be able to:	
	06.01	Configure the Windows interface and customize application features to meet user needs, including ADA accessibility.
	06.02	Configure and modify default user settings in Windows and applications to maximize user performance and to comply with business policies.
	06.03	Manage, maintain and backup Windows client computers according to business procedures and user needs without adversely affecting workplace activities.

	06.04	Migrate user data, settings and profile to a newly deployed and configured Windows computer.
	06.05	Configure, maintain and troubleshoot user account control and authentication issues, including resetting passwords, recovering encryption keys, modifying user accounts and group policies, and elevating privileges.
	06.06	Determine whether a client is receiving regularly scheduled updates and resolve issues.
	06.07	Configure and troubleshoot user access to network resources.
	06.08	Perform a system recovery on a user computer and backup user data.
	06.09	Describe methods of understanding and managing user's needs and expectations.
07.0	Perform help desk support activities. – The student will be able to:	
	07.01	Describe the various functions, operations, and departments within a business organization. (e.g., accounting, payroll, human resources, marketing).
	07.02	Describe the role of the IT support function within the business organization.
	07.03	Describe the incident management process and help desk service best practices when handling incidents.
	07.04	Apply systematic problem-solving and troubleshooting processes to typical end-user issues.
	07.05	Discuss the processes for resolving customer issues.
	07.06	Describe strategies for handling difficult clients and incidents.
	07.07	Identify and select a variety of tools and technologies that aid in the effective management of the help desk function.
	07.08	Describe the process of identifying and resolving customer needs within the context of the business enterprise.
	07.09	Describe the training process of end users and effective methods of delivering training materials.
	07.10	Present and follow oral and written instructions.
	07.11	Participate in group discussions as an IT support specialist and trainer.
	07.12	Describe the types of end user documentation and the process of developing technical instructions for end users.
	07.13	Prepare, outlining, and delivering a short IT training presentation.
	07.14	Use appropriate communication skills, courtesy, manners, and dress in the workplace.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Information Technology Analysis**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511010312
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 27 credit hours; Secondary: 28 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1121 – Computer Systems Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Computer Information Technology AS degree program (1511010307).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to microcomputer oriented operating procedures, software applications packages, and hardware in order to select the appropriate information technology equipment for a particular microcomputer-based work environment; install information technology equipment, troubleshoot information technology equipment, support information technology users.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate how to use current productivity software applications including word processing, spreadsheets, database, presentation software, email, and internet browser applications.
02.0 Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components.
03.0 Install, configure and troubleshoot system and device driver software and implement basic security measures.
04.0 Demonstrate knowledge of networking technologies, networking hardware, and data communication concepts, protocols, and routing methods.
05.0 Foundations of project management.
06.0 Perform customer service skills.
07.0 Perform computer information systems monitoring activities.
08.0 Perform computer information systems analysis activities.

Florida Department of Education
Student Performance Standards

Program Title: **Information Technology Analysis**
CIP Number: **0511010312**
Program Length: **Primary: 27 credit hours; Secondary: 28 credit hours**
SOC Code(s): **15-1121**

This certificate program is part of the Computer Information Technology AS degree program (1511010307). At the completion of this program, the student will be able to:	
01.0	Demonstrate how to use current productivity software applications including word processing, spreadsheets, database, presentation software, email, and internet browser applications. – The student will be able to:
01.01	Describe the components of personal computers and laptops and the common user interfaces.
01.02	Identify common types of computer application software such as word processing, spreadsheets, databases, web-browsing, and email and their uses.
01.03	Define and describe the components of a typical operating system interface.
01.04	Create, name, rename, copy, move, backup and delete files, folders and subfolders.
01.05	Create, save, edit and print a document file.
01.06	Format text, paragraphs, and documents.
01.07	Insert, and modify graphic objects, pictures and images.
01.08	Locate and identify the components of a worksheet.
01.09	Enter data on a worksheet and use formulas to perform calculations.
01.10	Use built-in arithmetic, statistical, and logic functions on tabular data.
01.11	Format worksheets using various formatting techniques.
01.12	Create charts and graphs.
01.13	Select a design template and apply it to a presentation.
01.14	Add text, pictures, objects, and multimedia elements to a slide.
01.15	Insert, delete, copy, and move slides.
01.16	Format and edit a presentation using the outline view and the slides pane view.

	01.17	Present a slide show.
	01.18	Distinguish between appropriate and inappropriate use of technology in a professional or academic setting.
	01.19	Distinguish between legal and illegal file-sharing practices in a network and the Internet.
	01.20	Identify the ways in which a computer virus can infect a computer such as through an email-attachment, loading a file from a disk or through a file-sharing network.
	01.21	Describe the most common threats to computer security, such as viruses, worms and spam.
	01.22	Use a website address and a web-browser to navigate to a specific website.
	01.23	Use an internet search engine to find a website on a specific topic.
	01.24	Save a web-address as a “favorite” or “bookmark” for later reference.
	01.25	Create, send, and forward an email message with a file attachment to individuals and to multiple recipients.
02.0	Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components. – The student will be able to:	
	02.01	Describe the architecture and operation of a typical computer system.
	02.02	Describe the use of binary numbers to represent instructions and data and the hardware implications thereof.
	02.03	Identify and manipulate various coding schemes including ASCII and other data types.
	02.04	Describe and identify motherboards and their components, including processors, memory, chipsets, I/O interfaces and expansions slots.
	02.05	Describe the features and types of computer form factors, chassis, power supplies and cooling devices.
	02.06	Describe and identify disk drives, optical drives and other mass storage devices.
	02.07	Distinguish between the different display devices and their characteristics.
	02.08	Summarize the function and types of adapter and interface cards.
	02.09	Construct and configure a computer system from individual components.
	02.10	Install, configure, optimize, and upgrade laptops and other portable devices.
	02.11	Perform file and system management tasks, system imaging, data backup, and use command-line utilities to manage and maintain a computer, its partitions, directories, and files.
	02.12	Perform the installation, configuration, optimization, maintenance, and upgrading of printers and other peripheral devices.
	02.13	Troubleshoot new and existing computers and peripheral devices, and document the problems discovered and the solutions implemented.

	02.14	Troubleshoot client-side network connectivity issues using appropriate tools.
	02.15	Identify potential hazards and implement proper safety procedures, including electrostatic discharge (ESD) precautions and professional operational procedures, safe work environment and equipment handling.
03.0	Install, configure and troubleshoot system and device driver software and implement basic security measures. – The student will be able to:	
	03.01	Describe the various types of device drivers used by operating systems and the utilities used to install, configure, manage, upgrade and troubleshoot system devices.
	03.02	Describe the device and driver installation process.
	03.03	Identify, install, configure and troubleshoot device drivers.
	03.04	Verify digital signatures of device drivers.
	03.05	Configure driver policies.
	03.06	Describe the security tools and features in operating systems and how to access them to perform a security audit and update.
	03.07	Install, configure and monitor firewalls to block dangerous incoming and outgoing network traffic.
	03.08	Install, configure and monitor anti-virus software.
	03.09	Perform anti-virus and other security scanning activities to prevent the infiltration of spyware and other malicious software.
	03.10	Install, configure and monitor updates and perform system audits.
	03.11	Install, configure, upgrade, monitor, and optimize security measures and policies.
	03.12	Perform preventative maintenance and activity monitoring for computer and network security.
04.0	Demonstrate knowledge of networking technologies, networking hardware, and data communication concepts, protocols, and routing methods. – The student will be able to:	
	04.01	Identify the advantages and disadvantages of networked and non-network environments.
	04.02	Describe current network environments, such as peer-to-peer and client/server.
	04.03	Identify and discuss issues such as security, privacy, and redundancy related to networked environments.
	04.04	Identify and discuss issues related to naming conventions for domains, hosts, users, email, and network devices.
	04.05	Differentiate between telecommunications and data communications.
	04.06	List and define the layers in the OSI and TCP/IP network protocol models.
	04.07	Identify and describe current relevant IEEE network standards.

	04.08	Describe and illustrate the typical logical and physical network topologies, and explain the advantages and disadvantages of each topology.
	04.09	Describe the major functions and implementation of LAN hardware protocols such as Ethernet, and identify the physical components currently in use.
	04.10	Describe the LAN software protocols in current use.
	04.11	Discuss the characteristics of IP addresses and MAC addresses, and mapping between protocol addressing schemes.
	04.12	Differentiate between hardware used to implement different network topologies, including bus, ring and star.
	04.13	Identify and describe the current cable technologies, including shielded and unshielded twisted-pair, coaxial, and fiber optic, and their features including bandwidth, performance, plenum characteristics, and interference rejection.
	04.14	Describe current wireless technologies including Wi-Fi, blue tooth, satellite, microwave, radio and infrared.
	04.15	Describe the advantages and disadvantages of wireless and cable technologies, and identify the environments best suited for each technology.
	04.16	Describe the functions and characteristics of network connectivity hardware, included hubs, repeaters, bridges, switches, access units, routers, and gateways.
	04.17	Describe the hardware needed to connect a local area network to a wide area network and the Internet.
	04.18	Compare and contrast major functions and features of current network operating systems, including directory and other services.
	04.19	Describe the major functions of network server hardware and software components.
	04.20	Install and configure a network server, including the installation of network hardware and software.
	04.21	Describe the major functions of network client hardware and software components.
	04.22	Install and configure network client software on multiple computer platforms with support for multiple network protocols.
	04.23	Describe the function of network storage devices and other peripherals, including NAS, SAN, RAID, tape backup, printers, telecommunications devices, scanners, copiers, imaging devices, and document center equipment.
	04.24	Install and configure storage devices and other peripherals with network access.
	04.25	Install, configure, update and troubleshoot network drivers for network hosts and peripherals.
	04.26	Configure and troubleshoot network protocol stacks.
	04.27	Describe the characteristics of the current wide area network technologies and determine the most suitable WAN technology for a given situation.
05.0	Foundations of project management. – The student will be able to:	
	05.01	Describe the steps in planning and managing a project.
	05.02	Define an implementation schedule for a project.

05.03	Participate in group discussions.
05.04	Choose appropriate actions in situations that require effective time management.
05.05	Describe a project life cycle from initiation to planning through execution, acceptance, support, quality, budgeting, and closure.
05.06	Understand the factors contributing to risk management planning.
05.07	Understand the project environment including: cultural, social, international, political and physical.
06.0	Perform customer service skills. – The student will be able to:
06.01	Identify and recognize user's state of mind and attitude.
06.02	Determine the customer needs using system analysis strategies.
06.03	Listen to the customer and ask appropriate questions.
06.04	Maintain a professional demeanor when dealing with difficult customers.
06.05	Provide suggested solutions using knowledge base.
06.06	Project professional appearance and demeanor.
06.07	Promote company services, products, and policies when appropriate.
06.08	Use tact when dealing with customers and competitors.
06.09	Maintain professional work ethics and follow policies and procedures.
06.10	Respect customer work space/environment.
06.11	Relate all information to customer in a manner that the customer can understand.
06.12	Set realistic expectations when establishing deadlines for customer solutions.
06.13	Communicate action plan including timelines.
06.14	Recognize the existence of internal/external customers and follow appropriate guidelines for each.
07.0	Perform computer information systems monitoring activities. – The student will be able to:
07.01	Create and review back up log.
07.02	Create and review server log.
07.03	Create and review application logs.

	07.04	Create and review resolution logs.
	07.05	Create and review security logs.
	07.06	Prepare a schedule to verify applications status.
	07.07	Prepare a schedule to verify backup status.
	07.08	Prepare a schedule to verify server status.
	07.09	Track network performance as compare to an established baseline.
	07.10	Identify problem trends and create resolution plans.
	07.11	Document statistical analysis and monitoring activities.
08.0	Perform computer information systems analysis activities. – The student will be able to:	
	08.01	Prepare appropriate systems and analysis charts and other visual aids.
	08.02	Describe the major steps in the systems development cycle.
	08.03	Perform basic business related tasks using the most appropriate software applications.
	08.04	Identify situations where software packages and/or custom developed packages need to be integrated with each other.
	08.05	Identify situations where software packages and/or hardware need to be integrated with software/hardware available on other types of computers.
	08.06	Select appropriate hardware devices to accomplish assigned tasks.
	08.07	Identify appropriate vendor sources for software, hardware and auxiliary supplies.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

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http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Help Desk Support Technician**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511010313
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 16 credit hours; Secondary: 18 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Computer Information Technology AS degree program (1511010307).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Install, configure, manage, deploy, monitor and troubleshoot Windows applications in a networked Windows environment.
02.0 Install, configure, use, manage, and troubleshoot microcomputer operating systems.
03.0 Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components.
04.0 Install, configure and troubleshoot system and device driver software and implement basic security measures.
05.0 Perform customer service skills.
06.0 Perform help desk support activities.

Florida Department of Education
Student Performance Standards

Program Title: **Help Desk Support Technician**
CIP Number: **0511010313**
Program Length: **Primary: 16 credit hours; Secondary: 18 credit hours**
SOC Code(s): **15-1151**

This certificate program is part of the Computer Information Technology AS degree program (1511010307). At the completion of this program, the student will be able to:	
01.0	Install, configure, manage, deploy, monitor and troubleshoot Windows applications in a networked Windows environment. – The student will be able to:
01.01	Analyze the business environment and select a Windows deployment and licensing method.
01.02	Describe the major steps and issues associated with Windows deployment and draft a Windows migration strategy.
01.03	Describe, install and configure the Windows deployment tools.
01.04	Perform data and user backup for migration to a new Windows environment.
01.05	Prepare, install and test a Windows Reference System including service packs and updates, device drivers, and base utilities and applications for the creation of a Windows Client Image.
01.06	Configure the Windows Reference System's settings to optimize performance, automate security and Windows updates, provide network access and administrative controls, and standardize Windows features to comply with business needs.
01.07	Create, capture, test and manage the custom image of the Windows Reference System.
01.08	Deploy the Windows Reference System to client computers in a networked environment.
01.09	Migrate current applications and user data after deployment and verify and troubleshoot deployment issues.
01.10	Configure, manage and troubleshoot Windows device drivers, network settings, peripheral devices and printers.
01.11	Join the Windows client to a domain and configure group policies.
01.12	Describe methods of establishing and controlling group policies.
01.13	Create, modify and administer local and domain users and groups for a Windows client.
01.14	Configure, manage and troubleshoot Windows client mobile features including configuring mobile devices, power management, disk encryption, wireless networking, VPN and remote access.
01.15	Configure, manage and troubleshoot Windows client access to the network, network resources, and the Internet.

	01.16	Configure, manage and troubleshoot administrative settings including: group policies, user profiles, permissions, user account control, event viewing, forwarding and logging, task scheduler, performance monitoring, Windows updates, security settings, firewall features, and authentication.
	01.17	Analyze business needs and licensing requirements in the selection of enterprise applications for deployment in networked environment.
	01.18	Assess Windows hardware requirements and compatibility with existing applications and devices.
	01.19	Perform application performance and compatibility testing and troubleshooting prior to application software installation.
	01.20	Install and configure business applications.
	01.21	Deploy single license applications on a client computer.
	01.22	Troubleshoot application software installation and compatibility issues.
	01.23	Describe the role of desktop support in a Windows domain environment.
	01.24	Perform management, testing, and troubleshoot activities.
	01.25	Document incidents and support activities.
	01.26	Perform post-installation tasks, compatibility and reliability testing, resolve performance issues, and perform a security audit.
	01.27	Utilize hardware and software installation tools to perform testing, maintenance and updates.
	01.28	Perform support functions for Windows clients, users and deployed applications, including end user support and training.
	01.29	Configure, manage and monitor administrative features and security settings.
	01.30	Document installed software, conduct license auditing, create a performance baseline, and draft a troubleshooting checklist.
02.0	Install, configure, use, manage, and troubleshoot microcomputer operating system. – The student will be able to:	
	02.01	Identify the fundamental principles of operating systems.
	02.02	Describe the general features and uses of current operating systems.
	02.03	Compare and contrast features of popular operating systems.
	02.04	Identify the names, locations, purposes, and contents of major operating system files.
	02.05	Use command line functions and utilities to manage the operating system, including proper syntax and switches.
	02.06	Create, view, and manage disks, directories and files, and change file attributes.
	02.07	Identify the major operating system utilities, their purpose, location, and options.

02.08	Install major operating systems and bring the operating system to a basic operational level.
02.09	Perform operating system upgrades.
02.10	Create an emergency boot disk with utilities utilizing basic system boot sequences and boot methods.
02.11	Optimize the operating system and major operating system subsystems.
02.12	Distinguish and interpret the meaning of common error codes and startup messages from the boot sequence and identify steps to correct the problems.
02.13	Recognize when to use common diagnostic utilities and tools.
02.14	Select and use system utilities and tools to diagnose, troubleshoot and resolve operating system problems.
02.15	Detect and resolve common operational and usability problems.
02.16	Discuss the network protocols used by operating systems.
02.17	Explain how networking is supported by various operating systems.
02.18	Configure operating systems to connect to a local area network.
02.19	Establish Internet connectivity.
02.20	Configure operating systems to connect to and use Internet resources.
02.21	Troubleshoot and diagnose basic network and Internet connectivity problems.
03.0	Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components. – The student will be able to:
03.01	Describe the architecture and operation of a typical computer system.
03.02	Describe the use of binary numbers to represent instructions and data and the hardware implications.
03.03	Identify and manipulate various coding schemes including ASCII and other data types.
03.04	Describe and identify motherboards and their components.
03.05	Describe the features and types of computer form factors, chassis, power supplies and cooling devices.
03.06	Describe and identify mass storage devices.
03.07	Distinguish between the different display devices and their characteristics.
03.08	Summarize the function and types of adapter and interface cards.
03.09	Construct and configure a computer system from individual components.

	03.10	Install, configure, optimize, and upgrade components in portable devices.
	03.11	Perform file and system management tasks, system imaging, data backup, and use command-line utilities to manage and maintain a computer, its partitions, directories, and files.
	03.12	Perform the installation, configuration, optimization, maintenance, and upgrading of printers and other peripheral devices.
	03.13	Troubleshoot new and existing computers and peripheral devices, and document the problems discovered and the solutions implemented.
	03.14	Troubleshoot client-side network connectivity issues using appropriate tools.
	03.15	Identify potential hazards and implement proper safety procedures, including electrostatic discharge (ESD) precautions and professional operational procedures, safe work environment and equipment handling.
04.0	Install, configure and troubleshoot system and device driver software and implement basic security measures. – The student will be able to:	
	04.01	Describe the various types of device drivers used by operating systems and the utilities used to install, configure, manage, upgrade and troubleshoot system devices.
	04.02	Describe the device and driver installation process.
	04.03	Identify, install, configure and troubleshoot device drivers.
	04.04	Verify digital signatures of device drivers.
	04.05	Configure driver policies.
	04.06	Describe the security tools and features in operating systems and how to access them to perform a security audit and update.
	04.07	Install, configure and monitor firewalls to block dangerous incoming and outgoing network traffic.
	04.08	Install, configure and monitor anti-virus software.
	04.09	Perform anti-virus and other security scanning activities to prevent the infiltration of spyware and other malicious software.
	04.10	Install, configure and monitor updates and perform system audits.
	04.11	Install, configure, upgrade, monitor, and optimize security measures and policies.
	04.12	Perform preventative maintenance and activity monitoring for computer and network security.
05.0	Perform customer service skills. – The student will be able to:	
	05.01	Identify and recognize user's state of mind and attitude.
	05.02	Determine the customer needs using system analysis strategies.
	05.03	Listen to the customer and ask appropriate questions.

05.04	Maintain a professional demeanor when dealing with difficult customers.
05.05	Provide suggested solutions using knowledge base.
05.06	Project professional appearance and demeanor.
05.07	Promote company services, products, and policies when appropriate.
05.08	Use tact when dealing with customers and competitors.
05.09	Maintain professional work ethics and follow policies and procedures.
05.10	Respect customer work space/environment.
05.11	Relate all information to customer in a manner that the customer can understand.
05.12	Set realistic expectations when establishing deadlines for customer solutions.
05.13	Communicate action plan including timelines.
05.14	Recognize the existence of internal/external customers and follow appropriate guidelines for each.
06.0	Perform help desk support activities. – The student will be able to:
06.01	Describe the various functions, operations, and departments within a business organization such as accounting, payroll, human resources and marketing.
06.02	Describe the role of the IT support function within the business organization.
06.03	Describe the incident management process and help desk service best practices when handling incidents.
06.04	Apply systematic problem-solving and troubleshooting processes to typical end-user issues.
06.05	Discuss the processes for resolving customer issues.
06.06	Describe strategies for handling difficult clients and incidents.
06.07	Identify and select a variety of tools and technologies that aid in the effective management of the help desk function.
06.08	Describe the process of identifying and resolving customer needs within the context of the business enterprise.
06.09	Describe the training process of end users and effective methods of delivering training materials.
06.10	Present and follow oral and written instructions.
06.11	Participate in group discussions as an IT support specialist and trainer.
06.12	Describe the types of end user documentation and the process of developing technical instructions for end users.

06.13 Prepare, outline, and deliver a short IT training presentation.
06.14 Use appropriate communication skills, courtesy, manners, and dress in the workplace.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Computer Programming Specialist**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511020103
Program Type	College Credit Certificate (CCC)
Program Length	18 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Computer Programming and Analysis AS degree program (1511020101).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to analyze business situations and to design, develop and write computer programs; to store, locate, and retrieve specific documents, data, and information; analyze problems using logic/analysis tools, code into computer language; test, monitor, debug, document and maintain computer programs.

More than one programming language should be addressed in this certificate program.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform data file activities.
02.0 Perform program design activities.
03.0 Perform coding activities.
04.0 Perform testing activities.
05.0 Perform implementation activities.

Florida Department of Education
Student Performance Standards

Program Title: **Computer Programming Specialist**
CIP Number: **0511020103**
Program Length: **18 credit hours**
SOC Code(s): **15-1131**

This certificate program is part of the Computer Programming and Analysis AS degree program (1511020101). At the completion of this program, the student will be able to:	
01.0	Perform data file activities. – The student will be able to:
01.01	Select the most efficient method of file organization for a given situation.
01.02	Identify security procedures to maintain integrity of files.
02.0	Perform program design activities. – The student will be able to demonstrate proficiency in design of information technology systems and:
02.01	Demonstrate knowledge of computer concepts and terminology.
02.02	Demonstrate understanding of computer systems architecture including components, networked environments, and operating systems.
02.03	Develop design specifications.
02.04	Select a feasible development environment.
02.05	Validate design specifications.
02.06	Document design.
02.07	Communicate design specifications.
02.08	Develop prototype.
03.0	Perform coding activities. – The student will be able to demonstrate proficiency in software fundamentals including control and data structures utilizing structured and object-oriented programming methodologies and will be able to:
03.01	Identify modules.
03.02	Design module.
03.03	Code module.
03.04	Document module.

	03.05 Test module.
	03.06 Debug code.
	03.07 Revise module code.
	03.08 Assemble modules.
	03.09 Demonstrate proficient use of programming development tools.
04.0	Perform testing activities. – The student will be able to:
	04.01 Develop test plan.
	04.02 Develop test data.
	04.03 Validate input(s).
	04.04 Perform test(s).
	04.05 Validate expected outcomes.
	04.06 Determine boundary test cases.
	04.07 Load-test the system.
	04.08 Revise program code.
	04.09 Document results.
05.0	Perform implementation activities. – The student will be able to:
	05.01 Develop an implementation plan.
	05.02 Install system.
	05.03 Validate system.
	05.04 Troubleshoot methodologies.
	05.05 Document implementation.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Computer Programmer**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511020200
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 33 credit hours; Secondary: 36 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Computer Programming and Analysis AS degree program (1511020101).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to analyze business situations and to design, develop and write computer programs; to store, locate, and retrieve specific documents, data, and information; analyze problems using logic/analysis tools, code into computer language; test, monitor, debug, document and maintain computer programs.

More than one programming language should be addressed in this certificate program.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform data file activities.
02.0 Perform analysis activities.
03.0 Perform program design activities.
04.0 Perform coding activities.
05.0 Perform testing activities.
06.0 Perform user-training activities.
07.0 Perform implementation activities.
08.0 Perform user support activities.
09.0 Perform evaluation activities.
10.0 Demonstrate professional development skills.
11.0 Demonstrate general organizational computing workplace competencies.

Florida Department of Education
Student Performance Standards

Program Title: **Computer Programmer**
CIP Number: **0511020200**
Program Length: **Primary: 33 credit hours; Secondary: 36 credit hours**
SOC Code(s): **15-1131**

This certificate program is part of the Computer Programming and Analysis AS degree program (1511020101). At the completion of this program, the student will be able to:
01.0 Perform data file activities. – The student will be able to:
01.01 Select the most efficient method of file organization for a given situation.
01.02 Identify security procedures to maintain integrity of files.
02.0 Perform analysis activities. – The student will demonstrate proficiency in analysis of information technology systems and be able to:
02.01 Communicate with users to ascertain system requirements.
02.02 Develop information system requirements to accomplish specific task.
02.03 Analyze and document user requirements.
02.04 Evaluate alternative~~s~~ solutions.
02.05 Analyze and document system requirements.
02.06 Create a plan for the design phase of an information technology system.
02.07 Develop a timeline for system development.
02.08 Communicate the plan.
02.09 Develop systems specifications.
02.10 Develop systems documentation.
02.11 Evaluate system performance.
02.12 Demonstrate understanding of technical and operational feasibility issues in determining a system solution.
02.13 Demonstrate knowledge, skills, and application of information systems to accomplish specific job objectives.

03.0	Perform program design activities. – The student will be able to demonstrate proficiency in design of information technology systems and:
03.01	Demonstrate knowledge of computer concepts and terminology.
03.02	Demonstrate understanding of computer systems architecture including components, networked environments, and operating systems.
03.03	Develop design specifications.
03.04	Select a feasible development environment.
03.05	Validate design specifications.
03.06	Document design.
03.07	Communicate design specifications.
03.08	Develop prototype.
04.0	Perform coding activities. – The student will be able to demonstrate proficiency in software fundamentals including control and data structures utilizing structured and object-oriented programming methodologies and will be able to:
04.01	Identify modules.
04.02	Design module.
04.03	Code module.
04.04	Document module.
04.05	Test module.
04.06	Debug code.
04.07	Revise module code.
04.08	Assemble modules.
04.09	Demonstrate proficient use of programming development tools.
05.0	Perform testing activities. – The student will be able to:
05.01	Develop test plan.
05.02	Develop test data.
05.03	Validate input(s).
05.04	Perform test(s).

	05.05 Validate expected outcomes.
	05.06 Determine boundary test cases.
	05.07 Load-test the system.
	05.08 Revise program code.
	05.09 Document results.
06.0	Perform user-training activities. – The student will be able to:
	06.01 Assist in development of user documentation.
	06.02 Assist in development of training plan.
	06.03 Demonstrate appropriate user training techniques.
07.0	Perform implementation activities – The student will be able to:
	07.01 Develop an implementation plan.
	07.02 Install system.
	07.03 Validate system.
	07.04 Troubleshoot methodologies.
	07.05 Document implementation.
08.0	Perform user-support activities. – The student will be able to:
	08.01 Demonstrate proficient use of productivity software (word processing, spreadsheets, databases, presentation) skills.
	08.02 Demonstrate appropriate communication and interpersonal skills.
	08.03 Determine the customer needs using system analysis strategies.
	08.04 Listen to the customer and ask appropriate questions.
	08.05 Persist when dealing with difficult customers maintaining a professional demeanor.
	08.06 Provide suggested information technology solutions using knowledge base.
	08.07 Understand how to research and understand specific corporate culture.
	08.08 Use tact when dealing with customer and competitors.

	08.09 Maintain professional work ethics and follow policies and procedures.
	08.10 Respect customer work space/environment.
	08.11 Set realistic expectations when establishing deadlines for customer solutions.
	08.12 Communicate action plan including timelines.
	08.13 Recognize the existence of internal/external customers and follow appropriate guidelines for each.
09.0	Perform evaluation activities. – The student will be able to:
	09.01 Review software development plans.
	09.02 Assess validity and performance of software systems.
	09.03 Identify improvements to software systems.
	09.04 Assist in revisions and enhancements of software systems.
	09.05 Assist in project evaluation.
	09.06 Recommend improvements.
	09.07 Provide feedback to management, users and peer groups.
10.0	Demonstrate professional development skills. – The student will be able to:
	10.01 Use on-line resources related to employee job requirements.
	10.02 Understand the importance of continuing development activities such as reading industry journals and magazines; attending trade shows, seminars and other continuing professional development activities; participating in professional organizations and developing professional contacts for future projects.
	10.03 Develop insights and skills through structured experimentation.
	10.04 Anticipate future industry trends.
	10.05 Understand the evolving nature of information technology systems and necessity of flexibility and willingness to implement needed changes.
	10.06 Set career goals/directions.
	10.07 Build mentor relationships.
11.0	Demonstrate general organizational computing workplace competencies. – The student will be able to:
	11.01 Follow oral and written instructions.
	11.02 Prepare, outline, and deliver a short oral presentation.

11.03	Participate in analysis, design, coding, implementation and documentation activities as a team member and as a group leader.
11.04	Utilize research skills to obtain appropriate information, graphics, and other data needed.
11.05	Prepare visual material to support an oral presentation.
11.06	Demonstrate self-motivation and responsibility to complete an assigned task.
11.07	List the steps in problem solving.
11.08	Choose appropriate action in situations requiring effective time management.
11.09	Identify and discuss issues contained within professional codes of conduct.
11.10	Identify and discuss software licensing issues.
11.11	Identify and discuss property rights and licensing issues.
11.12	Identify and discuss privacy issues.
11.13	Identify and discuss encryption issues.
11.14	Identify legal liability issues.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Oracle Certified Database Administrator**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511020307
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 15 credit hours; Secondary: 16 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Database Technology AS degree program (1511010308).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to database systems, software, programming and analysis and design of databases.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of the Oracle architectural components.
02.0 Demonstrate how to create an Oracle database instance.
03.0 Demonstrate how to manage an instance of the database.
04.0 Demonstrate how to maintain Redo log files, and how to use the data dictionary views.
05.0 Demonstrate how to manage tablespaces and datafiles.
06.0 Demonstrate an understanding of the Oracle storage structures.
07.0 Demonstrate the ability to query a database.
08.0 Demonstrate how to manage constraints and indexes.
09.0 Demonstrate a basic understanding of the Oracle Recovery Manager tool for performing backup and recovery operations.
10.0 Demonstrate the ability to perform backups.
11.0 Demonstrate the ability to perform recovery procedures.
12.0 Demonstrate how to configure and use a Flashback Database.
13.0 Demonstrate the different methods that are used to recover from user errors.
14.0 Demonstrate an understanding of how to detect and resolve block corruptions.
15.0 Demonstrate an understanding of the goals and processes of performance tuning.
16.0 Demonstrate capability to use the Oracle Database Resource Manager (DRM) to manage database and operating system performance.
17.0 Demonstrate how to automate management tasks, create scheduled jobs, programs, and schedules.
18.0 Demonstrate the ability to efficiently manage space-related inefficiencies of the database.
19.0 Demonstrate the ability to understand the issues with memory management and shall demonstrate how to configure memory manually.
20.0 Demonstrate the ability to set up an Oracle database to be deployed globally.
21.0 Demonstrate the ability to use Oracle diagnostic tools and the Oracle listener.

Florida Department of Education
Student Performance Standards

Program Title: **Oracle Certified Database Administrator**
CIP Number: **0511020307**
Program Length: **Primary: 15 credit hours; Secondary: 16 credit hours**
SOC Code(s): **15-1141**

This certificate program is part of the Database Technology AS degree program (1511010308). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of the Oracle architectural components. The student will be able to:
	01.01 Define an Oracle Database, the Oracle server, and the Oracle Instance, and Oracle database memory architecture.
	01.02 Explain the differences between Oracle 10g client and server installation.
	01.03 Use the Oracle Universal Installer to install Oracle on a host machine.
	01.04 Establish a connection and creating a session to the database instance.
	01.05 Explain the physical structure, memory structure, and process structure of the Oracle database.
02.0	Demonstrate how to create an Oracle database instance. The student will be able to:
	02.01 Explain the steps needed to create a database.
	02.02 Identify the database administrative tools.
	02.03 Configure the initial settings for creating the database.
	02.04 Create, start, and stop a database instance.
	02.05 Explain the basic steps in managing the configuration parameter files, and using Net Manager to configure Oracle Net Services.
03.0	Demonstrate how to manage an instance of the database. The student will be able to:
	03.01 Create, manage, and use the initialization files: PFILE and SPFILE.
	03.02 Identify the various states of starting an instance.
	03.03 Identify the various options available to shutdown an instance.
	03.04 Monitor the Alert and Trace files.

04.0	Demonstrate how to maintain Redo log files, and how to use the data dictionary views. The student will be able to:
04.01	Explain how the control file, data files, redo log files, and archive files are linked and work together.
04.02	Explain the uses of the control file.
04.03	List the contents of the control file.
04.04	Maintain and manage the online redo log files.
04.05	Obtain and archive online redo log file information
04.06	Use the Oracle Managed Files (OMF) to create, manage, and obtain information from the control files.
04.07	Identify the use and contents of the data dictionary.
04.08	Use the data dictionary to retrieve information about the database.
05.0	Demonstrate how to manage tablespaces and datafiles. The student will be able to:
05.01	Describe the storage hierarchy.
05.02	Differentiate between the logical and physical structures.
05.03	Create many types of tablespaces.
05.04	Configure and viewing storage for tablespaces and datafiles.
05.05	Use and managing undo data.
05.06	Describe and configuring diagnostic (trace) files.
06.0	Demonstrate an understanding of the Oracle storage structures. The student will be able to:
06.01	Describe and differentiating between the logical and physical structure of the database (segments, extents, blocks).
06.02	List the segment types and their uses.
06.03	Maintain storage structures with automatic segment – space management.
06.04	Maintain storage structures manually.
06.05	Obtain storage structure information.
07.0	Demonstrate the ability to query a database. The student will be able to:
07.01	Write basic SQL single row, datatype conversion, group, and user-defined functions.
07.02	Write filtered, sorted, and aggregated queries.
07.03	Write SQL statements using advanced queries involving joins, subqueries, and other specialized queries.

08.0	Demonstrate how to manage constraints and indexes. The student will be able to:
	08.01 List the different types of indexes, their uses, and constraints.
	08.02 Develop an example of each type of index.
	08.03 Create index-organized tables.
	08.04 Create, modify, and drop constraints
	08.05 Maintain indexes.
	08.06 Identify unused indexes.
09.0	Demonstrate a basic understanding of the Oracle Recovery Manager tool for performing backup and recovery operations. The student will be able to:
	09.01 Explain the different backup options available to the database administrator.
	09.02 Describe the Recovery Manager architecture.
	09.03 Start RMAN to connect to the database.
	09.04 Describe the different settings used to configure the persistent RMAN parameters.
10.0	Demonstrate the ability to perform backups. The student will be able to:
	10.01 Explain the purpose of the Flash Recovery area.
	10.02 Describe the various types of backups.
	10.03 Perform block-level backups.
	10.04 Implement the commands for performing backups at various levels.
	10.05 Demonstrate the use of the RUN command.
	10.06 Set Duration and Throttling.
	10.07 Explain the Block Tracking feature.
	10.08 Use RMAN commands to display information about backups.
11.0	Demonstrate the ability to perform recovery procedures. The student will be able to:
	11.01 Identify the different types of failures that occur in the database.
	11.02 Perform a complete recovery on a database.
	11.03 Perform an incomplete recovery on a database.
	11.04 Demonstrate how to perform a recovery of non-critical files.

12.0	Demonstrate how to configure and use a Flashback Database. The student will be able to:
12.01	Explain the Flashback Database feature.
12.02	Describe the components of Flashback Database.
12.03	Explain the guidelines and restrictions of Flashback Database.
12.04	Configure, maintain, and monitor Flashback Database.
12.05	Perform Flashback Database using SQL, RMAN, and Enterprise Manager.
12.06	Resolve errors that may occur during the Flashback Database creation operation.
13.0	Demonstrate the different methods that are used to recover from user errors. The student will be able to:
13.01	Describe the Flashback Technology features available in Oracle.
13.02	Explain the configuration and implementation of the Flashback Drop operation.
13.03	Manage the recycle bin.
13.04	Explain the configuration and implementation of the Flashback Query operation.
13.05	Recover from user errors using the Flashback Versions Query operation.
13.06	Perform transaction level recovery using Flashback Transaction Query operation.
13.07	Explain the configuration and implementation of the Flashback Table.
14.0	Demonstrate an understanding of how to detect and resolve block corruptions. The student will be able to:
14.01	Describe what block corruption is.
14.02	Identify instances of block corruptions.
14.03	Resolve block corruptions.
14.04	Use the ANALYZE command to check the integrity of a schema object (i.e., tables and indexes).
14.05	Describe the use of the DBVERIFY utility.
14.06	Utilize the DB_BLOCK_CHECKING parameter.
14.07	Execute the DBMS_REPAIR package.
14.08	Perform Block Media recovery using RMAN.

15.0	Demonstrate an understanding of the goals and processes of performance tuning. The student will be able to:
	15.01 Describe the job roles in performance tuning.
	15.02 List the steps in the tuning phases.
	15.03 Explain tuning goals and service level agreements.
	15.04 Describe common performance problems.
	15.05 Explain the tuning methodology.
16.0	Demonstrate how to use the Oracle Database Resource Manager (DRM) to manage database and operating system performance. The student will be able to:
	16.01 Explain the purpose of the Data Resource Manager.
	16.02 Describe each of the components of the DRM.
	16.03 Create consumer groups.
	16.04 Create resource plans.
	16.05 Create resource plan directives.
	16.06 Use the DRM to automatically map user sessions with consumer groups.
	16.07 Obtain information about database performance using the DRM.
17.0	Demonstrate how to automate management tasks, create scheduled jobs, programs, and schedules. The student will be able to:
	17.01 Use the Oracle Scheduler to create jobs, programs, and schedule tasks.
	17.02 Reuse the Scheduler to view information about job executions and job instances.
	17.03 Use the Scheduler to perform automatic gathering of optimizer statistics.
	17.04 Use the Scheduler to automatically gather object statistics to make efficient decisions about execution plans.
18.0	Demonstrate the ability to efficiently manage space-related inefficiencies of the database. The student will be able to:
	18.01 Tune redo writing and archiving operations.
	18.02 Set and modifying thresholds for space usage.
	18.03 Manage tablespace usage to reduce space-related error conditions.
	18.04 Use different storage options to improve the performance of queries.
	18.05 Manage Resumable Space Allocation using the DBMS_RESUMABLE package.

19.0	Demonstrate the ability to understand the issues with memory management and shall demonstrate how to configure memory manually. The student will be able to:
	19.01 Explain the memory structures in the Oracle instance and their function.
	19.02 Manually configure memory structures of the System Global Area (SGA).
	19.03 Implement Automatic Shared Memory Management.
	19.04 Configure the SGA parameters for various memory components in the SGA manually.
	19.05 Configure memory structures of the Program Global Area manually.
20.0	Demonstrate the ability to set up an Oracle database to be deployed globally. The student will be able to:
	20.01 Customize language-dependent behavior for the database and individual sessions.
	20.02 Specify different linguistic sorts for queries.
	20.03 Use date-time data types for different time zones.
	20.04 Query data using case-sensitive and accent-insensitive searches.
	20.05 Obtain globalization support configuration information.
21.0	Demonstrate the ability to use Oracle diagnostic tools and the Oracle listener. The student will be able to:
	21.01 Describe the purpose and use of the diagnostic tools that are available within the database.
	21.02 Describe the vulnerabilities of the listener and the different methods that can be used to secure it.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Oracle Certified Database Developer**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511020308
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 15 credit hours; Secondary: 16 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Database Technology AS degree program (1511010308).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to database systems, software, programming and analysis and design of databases.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate the use of general PL/SQL programming language fundamental constructs.
02.0 Demonstrate the use of DML simple selection statements in a PL/SQL block.
03.0 Demonstrate the use of conditional control IF and CASE statements.
04.0 Demonstrate the use of employing iterative control loops for iterating through a set of instructions.
05.0 Demonstrate the use of incorporating exception handling methods.
06.0 Demonstrate how to manipulate cursors and use parameters with cursors and complex nested cursors.
07.0 Demonstrate how to design and implement functions and procedures.
08.0 Demonstrate how to design and implement packages and triggers.
09.0 Demonstrate the use of collections to store and manipulate data.
10.0 Demonstrate how to manipulate large objects, such as LOB and BFILEs.
11.0 Demonstrate how to tune PL/SQL code and improve performance with caching.

Florida Department of Education
Student Performance Standards

Program Title: **Oracle Certified Database Developer**
CIP Number: **0511020308**
Program Length: **Primary: 15 credit hours; Secondary: 16 credit hours**
SOC Code(s): **15-1141**

This certificate program is part of the Database Technology AS degree program (1511010308). At the completion of this program, the student will be able to:	
01.0	Demonstrate the use of general PL/SQL programming language fundamental constructs. The student will be able to:
01.01	Employ PL/SQL language components including variables and identifiers.
01.02	Make use of anchored data types.
01.03	Explain the use of a block, nested block, and labels.
02.0	Demonstrate the use of DML simple selection statements in a PL/SQL block. The student will be able to:
02.01	Use the SELECT INTO syntax for variable initialization.
02.02	Use Data Manipulation Language statement sin a PL/SQL block.
02.03	Make use of a sequence in a PL/SQL block.
02.04	Make use of the COMMIT, ROLLBACK, and SAVEPOINT commands in a PL/SQL block.
03.0	Demonstrate the use of conditional control IF and CASE statement. The student will be able to:
03.01	Use the IF-THEN, and IF-THEN-ELSE control statements.
03.02	Use nested IF statements.
03.03	Use the CASE statement in a procedural block of code.
03.04	Use a CASE expression.
04.0	Demonstrate the use of employing iterative control loops for iterating through a set of instructions. The student will be able to:
04.01	Use simple loops with EXIT conditions.
04.02	Use simple loops with EXIT WHEN conditions.

	04.03 Use WHILE loops.
	04.04 Use numeric FOR loops with the IN and REVERSE option.
05.0	Demonstrate the use of incorporating exception handling methods. The student will be able to:
	05.01 Explain the use of error handling methods.
	05.02 Use built-in exception handling mechanisms.
	05.03 Create user-defined exceptions.
06.0	Demonstrate how to manipulate cursors and use parameters with cursors and complex nested cursors. The student will be able to:
	06.01 Utilize cursor attributes to control the memory where statements are executed.
	06.02 Process an explicit cursor.
	06.03 Use cursors to fetch rows.
	06.04 Use cursors for loops.
	06.05 Use parameters in a cursor.
	06.06 Use complex nested cursors.
	06.07 Use FOR UPDATE and WHERE CURRENT clause in a cursor.
07.0	Demonstrate how to design and implement functions and procedures. The student will be able to:
	07.01 Create procedures.
	07.02 Query the data dictionary for information on procedures.
	07.03 Use IN and OUT parameters with procedures.
	07.04 Create stored functions.
	07.05 Invoke functions with SQL statements.
08.0	Demonstrate how to design and implement packages and triggers. The student will be able to:
	08.01 Create package specifications.
	08.02 Create package bodies, package variables and cursors.

	08.03 Call stored packages.
	08.04 Write triggers in response to DML, DDL, system and user generated events.
09.0	Demonstrate the use of collections to store and manipulate data. The student will be able to:
	09.01 Use associative arrays.
	09.02 Use nested tables.
	09.03 Create table-based and cursor-based records.
	09.04 Create and use user-defined records.
10.0	Demonstrate how to manipulate large objects, such as LOB and BFILEs. The student will be able to:
	10.01 Describe a LOB object.
	10.02 Use BFILEs.
	10.03 Use DBMS_LOB.READ and DBMS_LOB.WRITE to manipulate LOBs.
	10.04 Create a temporary LOB programmatically with the DBMS_LOB package.
	10.05 Use SecureFile LOBs to store documents.
	10.06 Convert BasicFile LOBs to SecureFile LOB format.
	10.07 Enable reduplication and compression.
11.0	Demonstrate how to tune PL/SQL code and improve performance with caching. The student will be able to:
	11.01 Describe result caching.
	11.02 Use SQL query result cache.
	11.03 Use PL/SQL function cache.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Additional Resources

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Florida Department of Education
Curriculum Framework

Program Title: **Microsoft Certified Database Administrator**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511020309
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 15 credit hours; Secondary: 16 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Database Technology AS degree program (1511010308).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to database systems, software, programming and analysis and design of databases.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate how to design and implement a data warehouse.
02.0 Demonstrate how to extract and transform data.
03.0 Demonstrate how to load data.
04.0 Demonstrate how to configure and deploy SSIS solutions.

Florida Department of Education
Student Performance Standards

Program Title: **Microsoft Certified Database Administrator**
CIP Number: **0511020309**
Program Length: **Primary: 15 credit hours; Secondary: 16 credit hours**
SOC Code(s): **15-1141**

This certificate program is part of the Database Technology AS degree program (0511020308). At the completion of this program, the student will be able to:
01.0 Demonstrate how to design and implement a data warehouse. – The student will be able to:
01.01 Design and implement dimensions.
01.02 Design and implement fact tables.
02.0 Demonstrate how to extract and transform data. – The student will be able to:
02.01 Define connection managers.
02.02 Design data flow.
02.03 Implement data flow.
02.04 Manage SSIS package execution.
02.05 Implement script tasks in SSIS.
03.0 Demonstrate how to load data. – The student will be able to:
03.01 Design control flow.
03.02 Implement package logic by using SSIS variables and parameters.
03.03 Implement control flow.
03.04 Implement data load options.
03.05 Implement script components in SSIS.
04.0 Demonstrate how to configure and deploy SSIS solutions. – The student will be able to:
04.01 Troubleshoot data integration issues.
04.02 Install and maintain SSIS components.

04.03 Implement auditing, logging, and event handling.
04.04 Deploy SSIS solutions.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Additional Resources

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Florida Department of Education
Curriculum Framework

Program Title: **Microsoft Certified Systems Developer**
Career Cluster: **Information Technology**

NOTE: This program has been daggered for deletion with 2016-2017 being the last cohort of students permitted to enroll in the program. After 2016-2017, no new students may be enrolled in this program. Students already enrolled in the program may, at the college's discretion, continue taking courses in the program until completion.

CCC	
CIP Number	0511020310
Program Type	College Credit Certificate (CCC)
Program Length	15 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Database Technology AS degree program (1511010308).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to database systems, software, programming and analysis and design of databases.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency in developing and operating a database.
02.0 Demonstrate proficiency in manipulating a database and creating tables and data structures.
03.0 Demonstrate proficiency in developing applications and using the procedure builder tool.
04.0 Demonstrate proficiency in creating SQL procedural language blocks of application code that can be shared by multiple forms, reports and data management applications.
05.0 Demonstrate proficiency in creating a complete forms application using Developer/2000 while working in a graphical user interface (GUI) development environment.
06.0 Demonstrate proficiency in designing multiple forms applications.
07.0 Demonstrate proficiency in identifying the server physical and logical architecture.
08.0 Demonstrate proficiency in implementing and planning backup and recovery for the server.
09.0 Demonstrate proficiency in implementing a Net8 configuration on a workstation and server.

Florida Department of Education
Student Performance Standards

Program Title: **Microsoft Certified Systems Developer**
CIP Number: **0511020310**
Program Length: **15 credit hours**
SOC Code(s): **15-1141**

This certificate program is part of the Database Technology AS degree program (0511020309). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in developing and operating a database. – The student will be able to:
01.01	Build a relational database.
01.02	Query, display, and format data.
01.03	Save, retrieve, and run queries.
01.04	Build and format reports.
01.05	Group and summarize data.
02.0	Demonstrate proficiency in manipulating a database and creating tables and data structures. – The student will be able to:
02.01	Insert, update, automatically generate and delete data.
02.02	Control transaction processing.
02.03	Create, confirm, modify and remove tables to store data.
02.04	Apply business rules to ensure data integrity.
02.05	Restrict user access to tables.
02.06	Improve query performance.
03.0	Demonstrate proficiency in developing applications and using the procedure builder tool. – The student will be able to:
03.01	Develop programs in PL/SQL.
03.02	Insert and manipulate data with PL/SQL.
03.03	Manage and execute program units using the object navigator and the PL/SQL interpreter.

	03.04 Define and compile procedures using the program unit editor.
	03.05 Control the execution of a PL/SQL program unit.
	03.06 Test possible solutions by making changes to variables and procedures at runtime.
04.0	Demonstrate proficiency in creating PL/SQL procedural language blocks of application code that can be shared by multiple forms, reports and data management applications. – The student will be able to:
	04.01 Nest sub-queries within another SQL procedural language command.
	04.02 Develop applications using procedural capabilities.
	04.03 Insert and manipulate data with SQL procedural language.
	04.04 Use the procedure builder tool to develop and debug SQL procedure language code.
	04.05 Manage and execute program units using the object navigator and the SQL procedural language interpreter.
	04.06 Define environmental requirements for peripherals and media.
	04.07 Define and compile procedures using the program unit editor.
	04.08 Control the execution of an SQL procedural language program unit.
05.0	Demonstrate proficiency in creating a complete forms application using Developer/2000 while working in a graphical user interface (GUI) development environment. – The student will be able to:
	05.01 Build a new data block using an existing table specification.
	05.02 Save and run a form module from the designer.
	05.03 Develop a master/detail form module.
	05.04 Identify characteristics of each forms file storage type.
	05.05 Create forms containing check boxes, radio groups, containing list items, display items, image items and buttons.
	05.06 Start additional forms with the same transaction and session.
	05.07 Enhance the default menu.
	05.08 Add basic menu items.

	05.09 Attach a menu module to a forms module.
	05.10 Save and running a form module from the designer.
06.0	Demonstrate proficiency in designing multiple forms applications. – The student will be able to:
	06.01 Redefine function keys and determining when key triggers should be used or avoided.
	06.02 Cause a form module to respond to mouse movement and mouse button actions.
	06.03 Creating trigger code to interact with windows.
	06.04 Build robust multiple form transactions.
	06.05 Choose between different ways of invoking forms.
	06.06 Pass data between forms using parameter lists.
	06.07 Control coded events and methods.
07.0	Demonstrate proficiency in identifying the server physical and logical architecture. – The student will be able to:
	07.01 Identify and define the server architecture.
	07.02 Identify and utilize the functions and processes of the server.
	07.03 Create a database and construct the base data dictionary.
	07.04 Start up and shut down a database and instance.
08.0	Demonstrate proficiency in implementing and backup and recovery planning and backup of a server. – The student will be able to:
	08.01 Identify backup and recovery techniques.
	08.02 Define architecture implications for backup and recovery.
	08.03 Examine various failure scenarios and determining proper recovery strategies.
	08.04 Identify methods for restoration and recovery.
09.0	Demonstrate proficiency in implementing a Net8 configuration on the server and workstation. – The student will be able to:
	09.01 Establish a connection from the Net8 client and server using connection methods.
	09.02 Implement troubleshooting strategies for the networking environment.
	09.03 Explain security features in networking products.

09.04	Identify network problems using log and trace files.
09.05	Set logging and tracing parameters.
09.06	Start and stop the intelligent agent using the listener control utility.
09.07	Identify the configuration files used to define the intelligent agent.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Oracle Software Engineering**
Career Cluster: **Information Technology**

NOTE: This program has been daggered for deletion with 2016-2017 being the last cohort of students permitted to enroll in the program. After 2016-2017, no new students may be enrolled in this program. Students already enrolled in the program may, at the college's discretion, continue taking courses in the program until completion.

CCC	
CIP Number	0511020311
Program Type	College Credit Certificate (CCC)
Program Length	33 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1132 – Software Developers, Applications
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Database Technology AS degree program (1511010308).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to database systems, software, programming and analysis and design of databases.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency in developing and operating a database.
02.0 Demonstrate proficiency in manipulating a database and creating tables and data structures.
03.0 Demonstrate proficiency in developing applications and using the procedure builder tool.
04.0 Demonstrate proficiency in creating SQL procedural language blocks of application code that can be shared by multiple forms, reports and data management applications.
05.0 Demonstrate proficiency in creating a complete forms application using Developer/2000 while working in a graphical user interface (GUI) development environment.
06.0 Demonstrate proficiency in designing multiple forms applications.
07.0 Demonstrate proficiency in developing a variety of standard and custom reports using the reports component of Developer/2000 in a client/server environment.

Florida Department of Education
Student Performance Standards

Program Title: **Oracle Software Engineering**
CIP Number: **0511020311**
Program Length: **33 credit hours**
SOC Code(s): **15-1132**

This certificate program is part of the Database Technology AS degree program (1511010308). At the completion of this program, the student will be able to:
01.0 Demonstrate proficiency in developing and operating a database. – The student will be able to:
01.01 Build a relational database.
01.02 Query, display, and format data.
01.03 Save, retrieve, and run queries.
01.04 Build and format reports.
01.05 Group and summarize data.
02.0 Demonstrate proficiency in manipulating a database and creating tables and data structures. – The student will be able to:
02.01 Insert, update, automatically generate, and delete data.
02.02 Control transaction processing.
02.03 Create, confirm, modify and remove tables to store data.
02.04 Apply business rules to ensure data integrity.
02.05 Restrict user access to tables.
02.06 Improve query performance.
03.0 Demonstrate proficiency in developing applications and using the procedure builder tool. – The student will be able to:
03.01 Develop programs in PL/SQL.
03.02 Insert and manipulate data with PL/SQL.
03.03 Manage and execute program units using the object navigator and the PL/SQL interpreter.

	03.04 Define and compile procedures using the program unit editor.
	03.05 Control the execution of a PL/SQL program unit.
	03.06 Test possible solutions by making changes to variables and procedures at runtime.
04.0	Demonstrate proficiency in creating PL/SQL procedural language blocks of application code that can be shared by multiple forms, reports and data management applications. – The student will be able to:
	04.01 Nest sub-queries within another SQL procedural language command.
	04.02 Develop applications using procedural capabilities.
	04.03 Insert and manipulate data with SQL procedural language.
	04.04 Use the procedure builder tool to develop and debug SQL procedural language code.
	04.05 Manage and execute program units using the object navigator and the SQL procedural language interpreter.
	04.06 Define environmental requirements for peripherals and media.
	04.07 Define and compile procedures using the program unit editor.
	04.08 Control the execution of an SQL procedural language program unit.
05.0	Demonstrate proficiency in creating a complete forms application using Developer/2000 while working in a graphical user interface (GUI) development environment. – The student will be able to:
	05.01 Build a new data block using an existing table specification.
	05.02 Save and run a form module from the designer.
	05.03 Develop a master/detail form module.
	05.04 Identify characteristics of each forms file storage type.
	05.05 Create forms containing check boxes, radio groups, containing list items, display items, image items and buttons.
	05.06 Start additional forms with the same transaction and session.
	05.07 Enhance the default menu.
	05.08 Add basic menu items.
	05.09 Attach a menu module to a forms module.
	05.10 Save and run a form module from the designer.

06.0	Demonstrate proficiency in designing multiple forms applications. – The student will be able to:
06.01	Redefine function keys and determining when key triggers should be used or avoided.
06.02	Cause a form module to respond to mouse movement and mouse button actions.
06.03	Create trigger code to interact with windows.
06.04	Build robust multiple form transactions.
06.05	Choose between different ways of invoking forms.
06.06	Pass data between forms using parameter lists.
06.07	Control coded events and methods.
07.0	Demonstrate proficiency in developing a variety of standard and custom reports using the reports component of Developer/2000 in a client/server environment. – The student will be able to:
07.01	Design and execute a simple report.
07.02	Manage the appearance and display of data in reports with layout objects.
07.03	Customize the display of data in reports.
07.04	Tailor the appearance of simple and advanced business reports.
07.05	Integrate text and graphics in reports.
07.06	Import charts and graphs from the graphics component of Developer/2000.
07.07	Apply the packaged functions and procedures supplied with the reports component of Developer/2000.
07.08	Write queries to retrieve data.
07.09	Manage the structure of data in reports using data objects.
07.10	Determine how to best produce reports by analyzing report structures.
07.11	Filter report information from the database server.
07.12	Implement graphics into reports.
07.13	Build modules in Developer 2000 reports for use with other Developer/2000 tools.
07.14	Manage module storage and security.
07.15	Build reports in which the end user supplies values at runtime to control report output.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Oracle Certified Administrator**
Career Cluster: **Information Technology**

NOTE: This program has been daggered for deletion with 2016-2017 being the last cohort of students permitted to enroll in the program. After 2016-2017, no new students may be enrolled in this program. Students already enrolled in the program may, at the college's discretion, continue taking courses in the program until completion.

CCC	
CIP Number	0511020312
Program Type	College Credit Certificate (CCC)
Program Length	33 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Database Technology AS degree program (1511010308).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to database systems, software, management, and administration of databases.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency in developing and operating a database.
02.0 Demonstrate proficiency in manipulating a database and creating tables and data structures.
03.0 Demonstrate proficiency in identifying the server physical and logical architecture.
04.0 Demonstrate proficiency in implementing and planning backup and recovery for the server.
05.0 Demonstrate proficiency in implementing a Net8 configuration on a workstation and server.
06.0 Demonstrate proficiency in tuning a server.
07.0 Demonstrate proficiency in implementing database security.

Florida Department of Education
Student Performance Standards

Program Title: **Oracle Certified Administrator**
CIP Number: **0511020312**
Program Length: **33 credit hours**
SOC Code(s): **15-1141**

This certificate program is part of the Database Technology AS degree program (1511010308). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in developing and operating a database. – The student will be able to:
01.01	Build a relational database.
01.02	Query, display, and format data.
01.03	Save, retrieve, and run queries.
01.04	Build and format reports.
01.05	Group and summarize data.
02.0	Demonstrate proficiency in manipulating a database and creating tables and data structures. – The student will be able to:
02.01	Insert, update, automatically generate, and delete data.
02.02	Control transaction processing.
02.03	Create, confirm, modify and remove tables to store data.
02.04	Apply business rules to ensure data integrity.
02.05	Restrict user access to tables.
02.06	Improve query performance.
03.0	Demonstrate proficiency in identifying the server physical and logical architecture. – The student will be able to:
03.01	Identify and define the server architecture.
03.02	Identify and utilize the functions and processes of the server.
03.03	Create a database and construct the base data dictionary.
03.04	Start up and shut down a database and instance.

04.0	Demonstrate proficiency in implementing and backup and recovery planning and backup of a server. – The student will be able to:
04.01	Identify backup and recovery techniques.
04.02	Define architecture implications for backup and recovery.
04.03	Examine various failure scenarios and determining proper recovery strategies.
04.04	Identify methods for restoration and recovery.
05.0	Demonstrate proficiency in implementing a Net8 configuration on the server and workstation. – The student will be able to:
05.01	Establish a connection from the Net8 client and server using connection methods.
05.02	Implement troubleshooting strategies for the networking environment.
05.03	Explain security features in networking products.
05.04	Identify network problems using log and trace files.
05.05	Set logging and tracing parameters.
05.06	Start and stop the intelligent agent using the listener control utility.
05.07	Identify the configuration files used to define the intelligent agent.
06.0	Demonstrate proficiency in tuning a server. – The student will be able to:
06.01	Explain the nature of server tuning.
06.02	Outline the tuning methodology.
06.03	List and define available diagnostic tools.
06.04	Run the UTLBSTAT/UTLESTAT utility.
06.05	Exam latch contention.
06.06	Diagnose inappropriate use of the SYSTEM and TEMP tablespaces.
06.07	Ensure that files are distributed to minimize 1/0 contention.
07.0	Demonstrate proficiency in implementing database security. – The student will be able to:
07.01	Demonstrate an understanding of essential database security.
07.02	Set up and administer users and groups.
07.03	Use appropriate procedures to secure database resources.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

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Florida Department of Education
Curriculum Framework

Program Title: **Web Development Specialist**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511080103
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 35 credit hours; Secondary: 36 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Internet Services Technology AS degree program (1511080102).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to Internet, Intranet, and Extranet environments; installing, configuring, designing and managing Intranet and web-based resources.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency with Internet structure, organization, and navigation.
02.0 Understand, install and configure computer hardware.
03.0 Understand, install and configure computer software.
04.0 Perform enterprise architecture-related tasks.
05.0 Perform web design/development activities.
06.0 Perform programming and scripting activities.
07.0 Perform testing/troubleshooting activities.
08.0 Perform web site management activities.
09.0 Perform e-commerce-related tasks.
10.0 Demonstrate professional development skills.
11.0 Perform Documentation and Technical reference activities.
12.0 Perform general organizational computing workplace competencies.

Florida Department of Education
Student Performance Standards

Program Title: **Web Development Specialist**
CIP Number: **0511080103**
Program Length: **Primary: 35 credit hours; Secondary: 36 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the Internet Services Technology AS degree program (1511080102). At the completion of this program, the student will be able to:
01.0 Demonstrate proficiency with Internet structure, organization, and navigation. – The student will be able to:
01.01 Describe the structure of the Internet.
01.02 Define Internet push technologies, such as e-mail marketing vs. Web page banner advertising.
01.03 Differentiate among an Intranet site, an extranet site, and an Internet site.
01.04 Describe several major ethical issues related to Internet use.
01.05 Identify several legal issues related to Internet use.
01.06 Identify several examples to show how the Internet has affected intellectual property rights.
01.07 Identify several examples to show how the Internet has affected personal security and privacy.
01.08 Demonstrate the use of typical file types and protocols (http:, ftp:, mailto:, gopher:, telnet:).
01.09 Demonstrate the use of typical remote access mechanisms.
01.10 Differentiate among all valid WWW file types.
01.11 Differentiate among all WWW multimedia file types.
01.12 Describe components of URL and their meanings (including types).
01.13 Install and configure browser add-ons and plug-ins.
02.0 Understand, install and configure computer hardware. – The student will be able to:
02.01 Identify various coding schemes (ASCII).

03.0	Understand, install and configure computer software. – The student will be able to:
	03.01 Describe procedures for uninstalling operating system software.
	03.02 Install and configure system software.
	03.03 Install and configure applications software.
	03.04 Configure software for accessibility by disabled individuals.
	03.05 Install and configure applications software upgrades.
04.0	Perform enterprise architecture-related tasks. – The student will be able to:
	04.01 Describe the Human-Computer Interaction (HCI) factors that impact the design of a Web page and Web site.
	04.02 Determine the purpose of establishing an Internet site.
	04.03 Identify the intended audience that will access the Internet site.
	04.04 Determine user needs including secondary applications including database needs and select appropriate applications.
	04.05 Identify business processes to be automated.
	04.06 Determine client specifications.
	04.07 Determine design standards based on intended audience.
	04.08 Determine security standards that will meet business requirements.
	04.09 Install and configure system based on planning.
05.0	Perform web design/development activities. – The student will be able to:
	05.01 Describe and use the process of storyboarding a Web site.
	05.02 Describe format, structure and design principles for Web sites.
	05.03 Identify existing resources and constraints.
	05.04 Evaluate design based on current industry and in-house standards.
	05.05 Create site navigation plan including directory structure.
	05.06 Obtain in-house content and determine needs for secondary content providers.

05.07	Design page templates to implement on final site.
05.08	Create a Web page using authoring tools.
05.09	Code page(s) using current Web programming languages.
05.10	Check page for cross-browser capability and other access issues.
05.11	Upload pages and run site analysis.
05.12	Incorporate sound files onto a Web page.
05.13	Incorporate a streaming video file onto a Web page.
05.14	Incorporate a video file for download into a Web page.
05.15	Perform simple graphic modifications using a graphics utility.
05.16	Create virtual Web pages using a virtual reality modeling language.
05.17	Incorporate an e-mail link on a Web page.
05.18	Incorporate internal and external links on a Web page.
05.19	Incorporate frames, tables, and file transfer capabilities on a Web page.
05.20	Incorporate handicapped-accessibility options into the Web site.
05.21	Create a Web form and produce e-mail results.
05.22	Create a Web database interface.
05.23	Discuss the issue of ODBC compliance.
06.0	Perform programming and scripting activities. – The student will be able to:
06.01	Identify several of the most prominent current programming languages.
06.02	Characterize the stages of the system development life cycle.
06.03	Differentiate between structured programming and object-oriented programming.
06.04	Use procedural and object-oriented constructs of programming, scripting, and/or macro languages to create and test programs including batch files and menu programs.
06.05	Apply principles of good design and documentation when developing programs.

	06.06 Write scripting code to handle error checking in client forms.
	06.07 Write CGI programs to allow for interactions between the client and server.
	06.08 Write Java applets.
	06.09 Identify development tools and list in order of complexity of use.
	06.10 Review design specifications.
	06.11 Design and test algorithms.
	06.12 Write program according to specs.
	06.13 Test and debug code.
	06.14 Revise code based on testing procedures.
07.0	Perform testing/troubleshooting activities. – The student will be able to:
	07.01 Locate and use online documentation resources.
	07.02 Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
	07.03 Recognize and resolve basic hardware, software configuration, and peripheral device problems.
	07.04 Describe handicapped-accessibility features for a Web site.
	07.05 Describe appropriate security procedures and practices, including physical security and protection of resources through software measures such as passwords, antivirus software, data encryption.
	07.06 Revise system as required.
08.0	Perform web site management activities. – The student will be able to:
	08.01 Install and configure Web site management software.
	08.02 Implement appropriate Web site security measures.
09.0	Perform e-commerce-related tasks. – The student will be able to:
	09.01 Describe Web e-commerce.
	09.02 Analyze e-commerce models.
	09.03 Develop an e-commerce business plan.

10.0	Demonstrate professional development skills. – The student will be able to:
10.01	Identify corporate strategies and policies.
10.02	Anticipate future industry trends.
10.03	Continue education.
10.04	Review and analyze other industry productions.
10.05	Use and experiment with the technology.
11.0	Perform documentation and technical reference activities. – The student will be able to:
11.01	Use technical vocabulary appropriately.
11.02	Locate information in technical references.
11.03	Describe appropriate documentation procedures and practices.
11.04	Effectively use locally maintained systems, software, and network documentation.
11.05	Produce and maintain system documentation, such as inventory, costs, installed software, and procedures.
11.06	Perform Documentation and Technical reference activities.
11.07	Understand, Install and configure computer software.
11.08	Perform Troubleshooting activities.
11.09	Demonstrate understanding of networked environments.
11.10	Demonstrate proficiency with Internet structure, organization, and navigation.
11.11	Locate technical information online.
11.12	Evaluate information located through online research.
12.0	Perform general organizational computing workplace competencies. – The student will be able to:
12.01	Follow oral and written instructions.
12.02	Prepare, outline, and deliver a short oral presentation.
12.03	Participate in group discussion as a member and as a leader.
12.04	Obtain appropriate information form graphics, maps, or signs.

12.05	Prepare visual material to support an oral presentation.
12.06	Demonstrate self-motivation and responsibility to complete an assigned task.
12.07	Choose appropriate action in situations requiring effective time management.
12.08	Identify and discuss software licensing issues.
12.09	Identify and discuss property rights and licensing issues.
12.10	Identify and discuss privacy issues.
12.11	Identify and discuss encryption issues.
12.12	Identify legal liability issues.
12.13	Apply principles and techniques for being a productive, contributing member of a team.
12.14	Identify and use acceptable strategies for resolving conflict in the workplace.
12.15	Apply principles and techniques for working productively with people of diverse cultures and backgrounds.
12.16	Communicate effectively with individuals lacking a technical background.
12.17	Identify clear detailed technical oral instructions.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Server Administration**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100112
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 24 credit hours; Secondary: 18 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate understanding of computer network maintenance and support.
02.0 Demonstrate understanding of networking fundamentals.
03.0 Demonstrate understanding of operating system concepts and practices.
04.0 Demonstrate understanding of network security fundamentals.
05.0 Demonstrate an understanding of the directory infrastructure and installation.
06.0 Demonstrate an understanding of group policy.
07.0 Demonstrate an understanding of implementing sites to manage active directory replication.
08.0 Demonstrate an understanding of maintaining directory availability.
09.0 Demonstrate how to install and deploy a server operating system.
10.0 Demonstrate how to provide infrastructure services.
11.0 Demonstrate how to provide file and print services.
12.0 Demonstrate how to provide remote and wireless network access.
13.0 Demonstrate how to monitor and maintain network servers and services.
14.0 Demonstrate an understanding of securing data transmission and authentication.
15.0 Demonstrate an understanding of planning for business continuity and high availability.
16.0 Demonstrate workplace-readiness skills.

Florida Department of Education
Student Performance Standards

Program Title: **Network Server Administration**
CIP Number: **0511100112**
Program Length: **Primary: 24 credit hours; Secondary: 18 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate understanding of computer network maintenance and support. – The student will be able to:
01.01	Identify each of the following components and their functions: CPU, RAM, ROM, BIOS, motherboard, hard disk, removable media drives, monitor, network interface card, keyboard, mouse, security components and other computer peripherals.
01.02	Describe the operation of computer systems, including input and output systems, file systems, device management, program loading and execution and data storage.
01.03	Describe the safe and ethical use of computers.
01.04	Demonstrate proficiency in connecting to and safely using the Internet.
01.05	Describe emerging computer technologies and discuss their potential impact.
01.06	Implement proper procedures for handling and safeguarding equipment.
01.07	Describe procedures for proper disposal of computer components.
01.08	Install, configure, maintain and secure computer systems and peripherals following institutional protocol.
01.09	Configure and update firmware and ROM-BIOS.
01.10	Design and implement work order procedures.
01.11	Design and implement systems backups.
01.12	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
01.13	List the steps in problem solving.
01.14	Recognize and resolve basic computer configuration problems.

02.0	Demonstrate understanding of networking fundamentals. – The student will be able to:
02.01	Explain the use of binary numbers and perform binary arithmetic.
02.02	Describe current network environments, such as peer-to-peer and client/server.
02.03	Describe network communications and architecture.
02.04	Identify network components, media, connectors, applications and protocols.
02.05	Compare and contrast the OSI and TCP/IP reference models and their layers.
02.06	Identify and describe current relevant IEEE network standards.
02.07	Create an IP addressing scheme using Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
02.08	Identify and discuss issues related to networked environments, such as security, access control, fair use, privacy and redundancy.
02.09	Identify and discuss issues related to naming conventions for user IDs, email, passwords, and network hosts and devices.
02.10	Identify standard network topologies and describe the advantages and disadvantages of each topology.
02.11	Describe the major functions of LAN protocols such as Ethernet, token ring, FDDI.
02.12	Explain the functions of wireless components, standards, hardware, software, and infrastructure design.
02.13	Configure and manage the TCP/IP protocol stack.
02.14	Describe how TCP and UDP Port addresses, IP addresses, and MAC addresses function, and how they are used to deliver data across the network.
02.15	Identify major emerging technologies and discuss technical issues related to emerging technologies (e.g., security, bandwidth capability, gigabit transmission rates).
02.16	Design a LAN, including the specification of architecture, hardware and software.
02.17	Identify the advantages and use of VLANs.
02.18	Identify and explain wide area network (WAN) concepts.
02.19	Plan, configure and test a small network and establish baselines.
02.20	Describe the major functions of network server software components.
02.21	Install applications on a server and configure clients for network access.

03.0	Demonstrate an understanding of common operating system concepts and associated practices. – The student will be able to:
03.01	Describe the components and functions of major operating systems.
03.02	Compare and contrast major functions and features of current network operating systems (including directory services).
03.03	Install, configure and update client and server operating systems.
03.04	Describe the purpose and uses of computer virtualization.
03.05	Manage device drivers and software for peripheral devices.
03.06	Manage the network and firewall settings of a client.
03.07	Use an operating system for activities such as data and file management.
03.08	Identify current systems utilities and describe their functions.
03.09	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.10	Create, use, maintain, backup and restore system configuration files.
03.11	Describe procedures for uninstalling operating system software.
03.12	Install and configure client software for connecting to LANs, WANs, and the Internet.
03.13	Demonstrate knowledge of basic troubleshooting methodology.
04.0	Demonstrate fundamental proficiency in network security essentials. – The student will be able to:
04.01	Describe common security threats to, and vulnerabilities of, computer systems and the corresponding best practices for mitigation.
04.02	Define and describe malicious software and techniques to protect systems from its effects.
04.03	Describe Denial of Service attacks and means to defend against them.
04.04	Identify the risks and techniques of data loss and its prevention.
04.05	Describe the principles and techniques of securing data storage and transmission.
04.06	Identify current encryption and authentication standards.
04.07	Implement security policies, including compliance and operational security.
04.08	Enable access control, identity management and security logging.
04.09	Manage client and network system security software and related updates.

04.10	Describe the functions and characteristics of firewalls.
04.11	Perform a ping sweep to identify network hosts.
04.12	Perform a port scan to probe network hosts for open TCP and UDP ports.
04.13	Describe the purpose and operation of network protocol analyzers.
04.14	Utilize a network protocol analyzer to capture and analyze network traffic for security issues.
05.0	Demonstrate an understanding of the directory services infrastructure and installation. – The student will be able to:
05.01	Describe the architecture of Active Directory.
05.02	Discuss how Active Directory works.
05.03	Describe the Active Directory design, plan, and implementation processes.
05.04	Create a forest and domain structure.
05.05	Configure the Domain Name Service (DNS) in an Active Directory environment.
05.06	Raise the functional level of a forest and a domain.
05.07	Create trust relationships between domains.
05.08	Create, manage, and delegate administrative control for organizational units.
06.0	Demonstrate an understanding of group policy. – The student will be able to:
06.01	Create and configure group policy objects (GPOs).
06.02	Configure group policy refresh rates and group policy settings.
06.03	Manage GPOs.
06.04	Verify and troubleshoot group policy.
06.05	Delegate administrative control of group policy.
06.06	Plan a group policy strategy for the enterprise.
06.07	Configure, deploy and maintain applications using group policy, System Center tools and Terminal Services.
06.08	Monitor and maintain security policies.
06.09	Prepare and implement group policy strategy and backup/recovery of group policy objects.

07.0	Demonstrate an understanding of implementing sites to manage Active Directory replication. – The student will be able to:
	07.01 Discuss directory services replication.
	07.02 Design and document site topology.
	07.03 Manage site topology.
	07.04 Troubleshoot replication failures.
	07.05 Plan, create and configure a site.
	07.06 Implement the global catalog in Active Directory.
	07.07 Plan and determine the placement and type of domain controllers in Active Directory.
	07.08 Identify the various Operations Master Roles.
	07.09 Plan the placement of Operations Masters.
	07.10 Transfer and seize Operations Master Roles.
08.0	Demonstrate an understanding of maintaining Active Directory services availability. – The student will be able to:
	08.01 Create an Active Directory implementation plan for a business enterprise.
	08.02 Implement the Active Directory infrastructure for a business enterprise.
	08.03 Describe the maintenance of the Active Directory.
	08.04 Move and defragment an Active Directory database.
	08.05 Back up and restore a Active Directory.
	08.06 Monitor an Active Directory.
09.0	Demonstrate how to install and deploy a server operating system. – The student will be able to:
	09.01 Identify server operating system (OS) versions, editions, features and capabilities.
	09.02 Assess server installation readiness by inventorying hardware.

	09.03 Describe the methods, options and requirements for a Windows server installation and upgrade.
	09.04 Perform an attended and an unattended OS installation.
	09.05 Configure basic network settings.
	09.06 Configure storage.
	09.07 Configure operating systems licensing.
	09.08 Describe, identify and choose server roles and role services.
	09.09 Perform a system review and troubleshoot installation issues.
	09.10 Document the system installation.
	09.11 Automate server deployments using unattended installation tools and Windows.
	09.12 Implement deployment services.
10.0	Demonstrate how to provide infrastructure services. – The student will be able to:
	10.01 Describe the purpose and function of Dynamic Host Configuration Protocol (DHCP).
	10.02 Install, configure, and authorize the DHCP server role.
	10.03 Manage, backup and restore the DHCP Database.
	10.04 Configure the DHCP Relay Agent.
	10.05 Describe the DNS name resolution process.
	10.06 Configure DNS zones, records and replication.
	10.07 Integrate DNS servers with Active Directory.
	10.08 Configure name resolution for client computers.
11.0	Demonstrate how to provide file and print services. – The student will be able to:
	11.01 Design a file sharing strategy.
	11.02 Install the file and print server roles and services.
	11.03 Manage file sharing security, encryption, redundancy, and offline access.
	11.04 Manage disk quotas, file screening and shadow copy services.

11.05	Backup and restore files.
11.06	Configure Distributed File System (DFS) roots, targets and replication.
11.07	Identify and install print drivers.
11.08	Manage printer security, priorities, schedules and pools.
11.09	Publish printers and file shares to Active Directory.
11.10	Monitor and troubleshoot print and file services.
12.0	Demonstrate how to provide remote and wireless network access. – The student will be able to:
12.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
12.02	Configure static and dynamic routing, Network Address Translation (NAT) and Internet Connection Sharing (ICS).
12.03	Configure remote access services, protocols and policies, conditions and settings.
12.04	Configure Remote Access Dial-In User Service (RADIUS).
12.05	Configure wireless clients with Group Policy.
12.06	Monitor and troubleshoot remote access and wireless connections.
13.0	Demonstrate how to monitor and maintain network servers and services. – The student will be able to:
13.01	Monitor and compare network and server performance data to establish and document baselines, isolate problems and optimize performance, adaptability, and scalability.
13.02	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.
13.03	Monitor event logs for information, errors and warnings.
13.04	Maintain system documentation and service histories.
13.05	Configure server and client settings to implement patch management strategy.
13.06	Develop strategies for remote server management using command-line and GUI tools.
14.0	Demonstrate an understanding of securing data transmission and authentication. – The student will be able to:
14.01	Explain the social, ethical and technical issues regarding data integrity and confidentiality.
14.02	Secure network traffic using IPSec.

	14.03 Configure network authentication.
	14.04 Install, configure and manage certificate services.
	14.05 Describe and deploy a network access protection strategy.
	14.06 Configure firewall settings.
	14.07 Identify ports and protocols and create filters for incoming and outgoing traffic.
15.0	Demonstrate an understanding of planning for business continuity and high availability. – The student will be able to:
	15.01 Discuss virtualization architectures.
	15.02 Estimate data storage requirements.
	15.03 Select a storage technology.
	15.04 Plan for storage fault tolerance.
	15.05 Develop strategies to ensure application and service availability.
	15.06 Plan for backup and recovery of data, servers, and directory services.
16.0	Demonstrate workplace-readiness skills. – The student will be able to:
	07.01 Understand the value of proper communication in the classroom and workplace environment. Follow oral and written instructions.
	07.02 Participate in group discussions as a member and as a leader.
	07.03 Understand the importance of self-motivation and responsibility in completing assigned tasks.
	07.04 Choose appropriate actions in situations requiring effective time management.
	07.05 Apply principles and techniques for being a productive, contributing member of a team.
	07.06 Discuss the ethical aspects of intellectual property rights and licensing issues.
	07.07 Identify and discuss issues contained within professional codes of conduct.
	07.08 Use appropriate communication skills, courtesy, manners, and dress in the workplace.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Enterprise Administration**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100113
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 32 credit hours; Secondary: 29 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of computer network maintenance and support.
02.0 Demonstrate understanding of networking fundamentals.
03.0 Demonstrate an understanding of operating systems.
04.0 Demonstrate an understanding of network security fundamentals.
05.0 Demonstrate an understanding of the directory infrastructure and installation.
06.0 Demonstrate an understanding of group policy.
07.0 Demonstrate an understanding of implementing sites to manage active directory replication.
08.0 Demonstrate an understanding of maintaining directory availability.
09.0 Demonstrate how to install and deploy a server operating system.
10.0 Demonstrate how to provide infrastructure services.
11.0 Demonstrate how to provide file and print services.
12.0 Demonstrate how to provide remote and wireless network access.
13.0 Demonstrate how to monitor and maintain network servers and services.
14.0 Demonstrate an understanding of securing data transmission and authentication.
15.0 Demonstrate an understanding of planning for business continuity and high availability.
16.0 Demonstrate workplace-readiness skills.

Florida Department of Education
Student Performance Standards

Program Title: **Network Enterprise Administration**
CIP Number: **0511100113**
Program Length: **Primary: 29 credit hours; Secondary: 26 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic computer network maintenance and support. – The student will be able to:
01.01	Describe the main computer components and their functions.
01.02	Describe the operation of computer systems, including input and output systems, file systems, device management, program loading and execution and data storage.
01.03	Demonstrate the safe and ethical use of computers.
01.04	Demonstrate proficiency in connecting to and safely using the Internet.
01.05	Describe emerging computer technologies and discuss their potential impact.
01.06	Implement proper procedures for handling and safeguarding equipment.
01.07	Describe procedures for proper disposal of computer components.
01.08	Install, configure, maintain and secure computer systems and peripherals following institutional protocol.
01.09	Configure and update firmware and ROM-BIOS.
01.10	Implement work order procedures.
01.11	Design and implement systems redundancy and data backups.
01.12	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
01.13	List the steps in problem solving.
01.14	Recognize and resolve basic computer configuration problems.
02.0	Demonstrate a fundamental understanding of computer networking. – The student will be able to:
02.01	Explain the use of binary numbers and perform binary arithmetic.
02.02	Describe current network environments.

	02.03	Describe network communications and architecture.
	02.04	Identify network components, media, connectors, applications and protocols.
	02.05	Compare and contrast the OSI and TCP/IP reference models and their layers.
	02.06	Identify and describe current relevant IEEE network standards.
	02.07	Create an IP addressing scheme using Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
	02.08	Identify and discuss issues related to networked environments, such as security, access control, fair use, privacy and redundancy.
	02.09	Identify and discuss issues related to naming conventions for user IDs, email, passwords, and network hosts and devices.
	02.10	Identify standard network topologies and describe the advantages and disadvantages of each topology.
	02.11	Describe the major functions of LAN protocols.
	02.12	Explain the functions of wireless components, standards, hardware, software, and infrastructure design.
	02.13	Configure and manage the TCP/IP protocol stack.
	02.14	Describe how TCP and UDP Port addresses, IP addresses, and MAC addresses function, and how they are used to deliver data across the network.
	02.15	Identify emerging technologies and discuss related technical issues.
	02.16	Design a local area network (LAN), including the specification of architecture, hardware and software.
	02.17	Identify the advantages and use of virtual local area networks (VLANs).
	02.18	Identify and explain wide area network (WAN) concepts.
	02.19	Plan, configure and test a small network and establish baselines.
	02.20	Describe the major functions of network server software components.
	02.21	Install applications on a server and configure clients for network access.
03.0	Demonstrate an understanding of common operating system concepts and associated practices. – The student will be able to:	
	03.01	Describe the components and functions of major operating systems.
	03.02	Compare and contrast major functions and features of current network operating systems (including directory services).
	03.03	Install, configure and update client and server operating systems.
	03.04	Describe the purpose and uses of computer virtualization.
	03.05	Manage device drivers and software for peripheral devices.

03.06	Manage the network and firewall settings of a client.
03.07	Use an operating system for activities such as data and file management.
03.08	Identify current systems utilities and describe their functions.
03.09	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.10	Create, use, maintain, backup and restore system configuration files.
03.11	Describe procedures for uninstalling operating system software.
03.12	Install and configure client software for connecting to LANs, WANs, and the Internet.
03.13	Demonstrate knowledge of basic troubleshooting methodology.
04.0	Demonstrate fundamental proficiency in network security essentials. – The student will be able to:
04.01	Describe common security threats to, and vulnerabilities of, computer systems and the corresponding best practices for mitigation.
04.02	Define and describe malicious software and techniques to protect systems from its effects.
04.03	Describe Denial of Service attacks and means to defend against them.
04.04	Identify the risks and techniques of data loss and its prevention.
04.05	Describe the principles and techniques of securing data storage and transmission.
04.06	Identify current encryption and authentication standards.
04.07	Implement security policies, including compliance and operational security.
04.08	Enable access control, identity management and security logging.
04.09	Manage client and network system security software and related updates.
04.10	Describe the functions and characteristics of firewalls.
04.11	Perform a ping sweep to identify network hosts.
04.12	Perform a port scan to probe network hosts for open TCP and UDP ports.
04.13	Describe the purpose and operation of network protocol analyzers.
04.14	Utilize a network protocol analyzer to capture and analyze network traffic for security issues.

05.0	Demonstrate an understanding of the directory services infrastructure and installation. – The student will be able to:
05.01	Describe the architecture of Active Directory.
05.02	Discuss how Active Directory works.
05.03	Describe the Active Directory design, plan, and implementation processes.
05.04	Create a forest and domain structure.
05.05	Configure the Domain Name Service (DNS) in an Active Directory environment.
05.06	Raise the functional level of a forest and a domain.
05.07	Create trust relationships between domains.
05.08	Create, manage, and delegate administrative control for organizational units.
06.0	Demonstrate an understanding of group policy. – The student will be able to:
06.01	Create and configure group policy objects (GPOs).
06.02	Configure group policy refresh rates and group policy settings.
06.03	Manage GPOs.
06.04	Verify and troubleshoot group policy.
06.05	Delegate administrative control of group policy.
06.06	Plan a group policy strategy for the enterprise.
06.07	Configure, deploy and maintain applications using group policy, System Center tools and Terminal Services.
06.08	Monitor and maintain security policies.
06.09	Prepare and implement group policy strategy and backup/recovery of group policy objects.
07.0	Demonstrate an understanding of implementing sites to manage Active Directory replication. – The student will be able to:
07.01	Discuss directory services replication.
07.02	Design and document site topology.
07.03	Manage site topology.

	07.04 Troubleshoot replication failures.
	07.05 Plan, create and configure a site.
	07.06 Implement the global catalog in Active Directory.
	07.07 Plan and determine the placement and type of domain controllers in Active Directory.
	07.08 Identify the various Operations Master Roles.
	07.09 Plan the placement of Operations Masters.
	07.10 Transfer and seize Operations Master Roles.
08.0	Demonstrate an understanding of maintaining Active Directory services availability. – The student will be able to:
	08.01 Create an Active Directory implementation plan for a business enterprise.
	08.02 Implement the Active Directory infrastructure for a business enterprise.
	08.03 Describe the maintenance of the Active Directory.
	08.04 Move and defragment an Active Directory database.
	08.05 Back up and restore a Active Directory.
	08.06 Monitor an Active Directory.
09.0	Demonstrate how to install and deploy a server operating system. – The student will be able to:
	09.01 Identify server operating system (OS) versions, editions, features and capabilities.
	09.02 Assess server installation readiness by inventorying hardware.
	09.03 Describe the methods, options and requirements for a Windows server installation and upgrade.
	09.04 Perform an attended and an unattended OS installation.
	09.05 Configure basic network settings.
	09.06 Configure storage.
	09.07 Configure operating systems licensing.
	09.08 Describe, identify and choose server roles and role services.

09.09	Perform a system review and troubleshoot installation issues.
09.10	Document the system installation.
09.11	Automate server deployments using unattended installation tools and Windows.
09.12	Implement deployment services.
10.0	Demonstrate how to provide infrastructure services. – The student will be able to:
10.01	Describe the purpose and function of Dynamic Host Configuration Protocol (DHCP).
10.02	Install, configure, and authorize the DHCP server role.
10.03	Manage, backup and restore the DHCP Database.
10.04	Configure the DHCP Relay Agent.
10.05	Describe the DNS name resolution process.
10.06	Configure DNS zones, records and replication.
10.07	Integrate DNS servers with Active Directory.
10.08	Configure name resolution for client computers.
11.0	Demonstrate how to provide file and print services. – The student will be able to:
11.01	Design a file sharing strategy.
11.02	Install the file and print server roles and services.
11.03	Manage file sharing security, encryption, redundancy, and offline access.
11.04	Manage disk quotas, file screening and shadow copy services.
11.05	Backup and restore files.
11.06	Configure Distributed File System (DFS) roots, targets and replication.
11.07	Identify and install print drivers.
11.08	Manage printer security, priorities, schedules and pools.
11.09	Publish printers and file shares to Active Directory.
11.10	Monitor and troubleshoot print and file services.

12.0	Demonstrate how to provide remote and wireless network access. – The student will be able to:
12.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
12.02	Configure static and dynamic routing, Network Address Translation (NAT) and Internet Connection Sharing (ICS).
12.03	Configure remote access services, protocols and policies, conditions and settings.
12.04	Configure Remote Access Dial-In User Service (RADIUS).
12.05	Configure wireless clients with Group Policy.
12.06	Monitor and troubleshoot remote access and wireless connections.
13.0	Demonstrate how to monitor and maintain network servers and services. – The student will be able to:
13.01	Monitor and compare network and server performance data to establish and document baselines, isolate problems and optimize performance, adaptability, and scalability.
13.02	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.
13.03	Monitor event logs for information, errors and warnings.
13.04	Maintain system documentation and service histories.
13.05	Configure server and client settings to implement patch management strategy.
13.06	Develop strategies for remote server management using command-line and GUI tools.
14.0	Demonstrate an understanding of securing data transmission and authentication. – The student will be able to:
14.01	Explain the social, ethical and technical issues regarding data integrity and confidentiality.
14.02	Secure network traffic using IPSec.
14.03	Configure network authentication.
14.04	Install, configure and manage certificate services.
14.05	Describe and deploy a network access protection strategy.
14.06	Configure firewall settings.
14.07	Identify ports and protocols and create filters for incoming and outgoing traffic.
15.0	Demonstrate an understanding of planning for business continuity and high availability. – The student will be able to:
15.01	Discuss virtualization architectures.
15.02	Estimate data storage requirements.

	15.03 Select a storage technology.
	15.04 Plan for storage fault tolerance.
	15.05 Develop strategies to ensure application and service availability.
	15.06 Plan for backup and recovery of data, servers, and directory services.
16.0	Demonstrate workplace-readiness skills. – The student will be able to:
	16.01 Understand the value of proper communication in the classroom and workplace environment. Follow oral and written instructions.
	16.02 Participate in group discussions as a member and as a leader.
	16.03 Understand the importance of self-motivation and responsibility in completing assigned tasks.
	16.04 Choose appropriate actions in situations requiring effective time management.
	16.05 Apply principles and techniques for being a productive, contributing member of a team.
	16.06 Discuss the ethical aspects of intellectual property rights and licensing issues.
	16.07 Identify and discuss issues contained within professional codes of conduct.
	16.08 Use appropriate communication skills, courtesy, manners, and dress in the workplace.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Infrastructure**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100114
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 21 credit hours; Secondary: 16 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1152 – Computer Network Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112), and is aligned with the Cisco Certified Network Associate (CCNA) industry certification.

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate a fundamental understanding of computer networking.
02.0 Demonstrate an understanding of routing concepts.
03.0 Demonstrate router configuration skills.
04.0 Demonstrate an understanding of LAN design and concepts.
05.0 Demonstrate VLAN configuration skills.
06.0 Demonstrate an understanding of basic wireless concepts and configuration.
07.0 Demonstrate an understanding of wide area networks (WAN).
08.0 Demonstrate Wide Area Network configuration skills.
09.0 Demonstrate an understanding of network security.
10.0 Demonstrate an understanding of remote access.
11.0 Demonstrate an understanding of IP Addressing Services.
12.0 Demonstrate an understanding of network maintenance, support and troubleshooting.

Florida Department of Education
Student Performance Standards

Program Title: Network Infrastructure
CIP Number: Information Technology
Program Length: Primary: 21 credit hours; Secondary: 16 credit hours
SOC Code(s): 15-1152

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate a fundamental understanding of computer networking. – The student will be able to:
01.01	Explain the use of binary numbers and perform binary arithmetic.
01.02	Describe current network environments.
01.03	Describe network communications and architecture.
01.04	Identify network components, media, connectors, applications and protocols.
01.05	Compare and contrast the OSI and TCP/IP reference models and their layers.
01.06	Identify and describe current relevant IEEE network standards.
01.07	Create an IP addressing scheme using Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
01.08	Identify and discuss issues related to networked environments, such as security, access control, fair use, privacy and redundancy.
01.09	Identify and discuss issues related to naming conventions for user IDs, email, passwords, and network hosts and devices.
01.10	Identify standard network topologies and describe the advantages and disadvantages of each topology.
01.11	Describe the major functions of LAN protocols.
01.12	Explain the functions of wireless components, standards, hardware, software, and infrastructure design.
01.13	Configure and manage the TCP/IP protocol stack.
01.14	Describe how TCP and UDP Port addresses, IP addresses, and MAC addresses function, and how they are used to deliver data across the network.
01.15	Identify emerging technologies and discuss related technical issues.
01.16	Design a local area network (LAN), including the specification of architecture, hardware and software.

01.17	Identify the advantages and use of virtual local area networks (VLANs).
01.18	Identify and explain wide area network (WAN) concepts.
01.19	Plan, configure and test a small network and establish baselines.
01.20	Describe the major functions of network server software components.
01.21	Install applications on a server and configure clients for network access.
02.0	Demonstrate an understanding of routing concepts. – The student will be able to:
02.01	Describe the purpose, architecture, and operations of a router.
02.02	Identify the hardware and software components of routers.
02.03	Explain the purpose and nature of routing tables.
02.04	Describe administrative distance and routing metrics such as hop counts and cost.
02.05	Describe how a router determines a path and switches packets.
02.06	Differentiate between static and dynamic routing.
02.07	Explain the differences between class-full and classless routing.
02.08	Describe the use and operation of VLSM and CIDR.
02.09	Describe how a network converges.
03.0	Demonstrate router configuration skills. – The student will be able to:
03.01	Configure and verify router interfaces.
03.02	Perform basic router configuration using the Command Line Interface (CLI) to inspect the operations of the router.
03.03	Design and implement a classless IP addressing scheme for a network.
03.04	Configure a router for RIP version 2 operation.
03.05	Use advanced configuration commands with routers.
03.06	Configure a router for OSPF routing in a network.
03.07	Fine-tune OSPF settings on a router, including the configuration of reference bandwidth, redistribution of static and default routes, and modification of OSPF intervals, in order to optimize network performance.
03.08	Verify and troubleshoot router operations in an OSPF network.

03.09	Configure and modify metric on a router to improve network performance.
03.10	Configure summarization and default route settings on a router to optimize network performance.
03.11	Verify and troubleshoot router operations in complex network environment.
04.0	Demonstrate an understanding of LAN design and concepts. – The student will be able to:
04.01	Identify the layers and functions of switched network architecture.
04.02	Describe the principles and benefits of a hierarchical network design.
04.03	Explain the technology and media access control method for Ethernet networks.
04.04	Describe the issues associated with Layer 2.
04.05	Describe the operation of a LAN switch.
04.06	Describe the benefits of Virtual Local Area Networks (VLAN).
04.07	Identify and describe the different VLAN encapsulation protocols and their operation.
04.08	Describe the purpose and operation of VLAN Trunking Protocol (VTP) in the management of a switched network domain.
04.09	Describe the purpose and operation of Spanning Tree Protocol (STP), and its variants.
04.10	Describe the use of Inter-VLAN routing to connect different Networks in a switch-based network topology.
04.11	Analyze business requirements and design a LAN structure to meet those requirements.
04.12	Discuss quality-of-service considerations and switching prioritization.
05.0	Demonstrate VLAN configuration skills. – The student will be able to:
05.01	Perform and verify initial LAN switch configuration tasks including remote access management, switch port modes, and trunks.
05.02	Configure, verify, and troubleshoot VLANs on a LAN switch.
05.03	Implement a VLAN Domain by configuring LAN switches for VTP network operation.
05.04	Configure a router to provide Inter-VLAN routing using multiple physical interfaces, and on a single physical interface with sub-interfaces.
05.05	Configure and troubleshoot STP and its variants on a switched network environment.
05.06	Configure and verify the bridge to optimize STP.
05.07	Establish and configure port priorities.

	05.08 Troubleshoot and resolve issues with STP operations.
	05.09 Manage router and switch OS software.
06.0	Demonstrate an understanding of basic wireless concepts and configuration. – The student will be able to:
	06.01 Describe standards associated with wireless media, including IEEE, Wi-Fi Alliance, and ITU/FCC standards.
	06.02 Identify and describe the purpose of the components in a small wireless network such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS).
	06.03 Perform a site survey and identify common implementation issues.
	06.04 Identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points.
	06.05 Configure and verify WLAN design and functionality.
	06.06 Describe and configure wireless security, including Wi-Fi Protected Access (WPA).
	06.07 Describe and troubleshoot common wireless-network implementation issues such as interference and misconfiguration.
07.0	Demonstrate an understanding of wide area networks (WAN). – The student will be able to:
	07.01 Describe WAN and MAN topologies.
	07.02 Differentiate between WAN and LAN topologies.
	07.03 Identify and describe WAN protocols.
	07.04 Describe the impact of applications (Voice Over IP, Video Over IP) on a network.
	07.05 Identify major network issues associated with the Internet, intranets and extranets.
	07.06 Explain the differences between the use of leased lines, packet-switched, and circuit-switched technologies.
	07.07 Describe typical WAN links and discuss bandwidth considerations.
	07.08 Identify and manage licensing.
08.0	Demonstrate Wide Area Network configuration skills. – The student will be able to:
	08.01 Configure and verify Point-to-Point WAN connection.
	08.02 Configure and verify a packet switched WAN connection.
	08.03 Configure and verify a basic WAN serial connection, a PPP connection between routers, and Frame Relay.
	08.04 Configure and verify a PPP connection between routers, and verify a Frame Relay between routers.

	08.05	Troubleshoot WAN implementation issue.
	08.06	Implement LAN/WAN connections, including virtual private networks (VPN), permanent virtual circuits (PVC), Frame Relay, tunneling, remote and mobile user access.
09.0	Demonstrate an understanding of network security. – The student will be able to:	
	09.01	Implement basic switch security measures such as port security, trunk access, and management VLANs.
	09.02	Identify current network security threats and explaining how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications.
	09.03	Describe the functions of common security appliances and applications.
	09.04	Implement recommended security practices to secure network devices.
	09.05	Discuss the functions of authentication servers.
	09.06	Describe the function and use of Access Control Lists (ACLs).
	09.07	Verify, monitor, and troubleshoot ACLs in a network environment.
10.0	Demonstrate an understanding of remote access. – The student will be able to:	
	10.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
	10.02	Configure static and dynamic routing, Network Address Translation (NAT) and Internet Connection Sharing (ICS).
	10.03	Configure remote access services, protocols and policies, conditions and settings.
	10.04	Configure remote access Dial-In User Service (RADIUS).
	10.05	Configure wireless clients with Group Policy.
	10.06	Monitor and troubleshoot remote access and wireless connections.
11.0	Demonstrate an understanding of IP addressing services. – The student will be able to:	
	11.01	Describe the purpose and operation of DHCP and DNS in a networked environment.
	11.02	Configure, verify, and troubleshoot DHCP and DNS operation on a router.
	11.03	Describe the operation and use of NAT and Port Address Translation (PAT) to provide Internet access to Private IP Address networks.
	11.04	Configure, verify, and troubleshoot NAT on a router, including static translation, use of IP Address pools, and sharing a public IP address on a router interface.
	11.05	Describe the purpose and operation of IPv6.
	11.06	Configure, verify, and troubleshoot IPv6 routing in a network.

12.0	Demonstrate an understanding of network maintenance, support and troubleshooting. – The student will be able to:	
	12.01	Identify, interpret and maintain network documentation, procedures and practices.
	12.02	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
	12.03	Follow standard operating procedures for troubleshooting hardware and software.
	12.04	Manage, maintain and backup router and switch system and configuration files.
	12.05	Recognize and resolve hardware and software configuration problems.
	12.06	Identify and resolve common network problems at Layers 1, 2, 3, and 7 using a layered model approach. Describe the use and features of diagnostic test equipment.
	12.07	Determine type of programs and procedures required to: baseline network performance, identify intrusion and unacceptable system use, identify performance issues, predict system failures, and optimize network availability.
	12.08	Use network monitoring and management tools effectively to integrate and manage network resources.
	12.09	Explain RMON and SNMP and their use in monitoring a network.
	12.10	Configure network devices to send SNMP traps or alerts to network management systems.
	12.11	Establish and document a network baseline.
	12.12	Compare and analyze initial performance measurements with the availability of critical network devices and connections to determine the difference between abnormal behavior and proper network performance as the network grows or traffic patterns change.
	12.13	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
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Florida Department of Education
Curriculum Framework

Program Title: **Advanced Network Infrastructure**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100115
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 36 credit hours; Secondary: 28 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer System Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112)

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of routing concepts.
02.0 Demonstrate an understanding of routing protocols.
03.0 Demonstrate router configuration skills.
04.0 Demonstrate an understanding of LAN design and concepts.
05.0 Demonstrate VLAN configuration skills.
06.0 Demonstrate an understanding of basic wireless concepts and configuration.
07.0 Demonstrate an understanding of wide area networks (WAN).
08.0 Demonstrate Wide Area Network configuration skills.
09.0 Demonstrate an understanding of network security.
10.0 Demonstrate an understanding of remote access.
11.0 Demonstrate an understanding of IP addressing services.
12.0 Demonstrate an understanding of network maintenance, support and troubleshooting.

Florida Department of Education
Student Performance Standards

Program Title: **Advanced Network Infrastructure**
CIP Number: **0511100115**
Program Length: **Primary: 36 credit hours; Secondary: 28 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of routing concepts. – The student will be able to:
01.01	Describe the purpose, architecture, and operations of a router.
01.02	Identify the hardware and software components of routers.
01.03	Explain the purpose and nature of routing tables.
01.04	Describe administrative distance and routing metrics such as hop counts and cost.
01.05	Describe how a router determines a path and switches packets.
01.06	Differentiate between static and dynamic routing.
01.07	Explain the differences between class-full and classless routing.
01.08	Describe the use and operation of VLSM and CIDR.
01.09	Describe how a network converges.
02.0	Demonstrate an understanding of routing protocols. – The student will be able to:
02.01	Describe the characteristics of distance vector routing protocols.
02.02	Describe the characteristics of link state routing protocols.
02.03	Describe the differences between distance vector and link state routing protocols and determine the best routing protocol to use in a given situation.
02.04	Describe the features and operation of current internal and external routing protocols.
03.0	Demonstrate router configuration skills. – The student will be able to:
03.01	Configure and verify router interfaces.
03.02	Perform basic router configuration using the Command Line Interface (CLI) to inspect the operations of the router.

	03.03	Design and implement a classless IP addressing scheme for a network.
	03.04	Configure a router for RIP version 2 operation.
	03.05	Use advanced configuration commands with routers.
	03.06	Configure a router for OSPF routing in a network.
	03.07	Fine-tune OSPF settings on a router, including the configuration of reference bandwidth, redistribution of static and default routes, and modification of OSPF intervals, in order to optimize network performance.
	03.08	Verify and troubleshoot router operations in an OSPF network.
	03.09	Configure and modify metric on a router to improve network performance.
	03.10	Configure summarization and default route settings on a router to optimize network performance.
	03.11	Verify and troubleshoot router operations in complex network environment.
04.0	Demonstrate an understanding of LAN design and concepts. – The student will be able to:	
	04.01	Identify the layers and functions of switched network architecture.
	04.02	Describe the principles and benefits of a hierarchical network design.
	04.03	Explain the technology and media access control method for Ethernet networks.
	04.04	Describe the issues associated with Layer 2.
	04.05	Describe the operation of a LAN switch.
	04.06	Describe the benefits of Virtual Local Area Networks (VLAN).
	04.07	Identify and describe the different VLAN encapsulation protocols and their operation.
	04.08	Describe the purpose and operation of VLAN Trunking Protocol (VTP) in the management of a switched network domain.
	04.09	Describe the purpose and operation of Spanning Tree Protocol (STP), and its variants.
	04.10	Describe the use of Inter-VLAN routing to connect different Networks in a switch-based network topology.
	04.11	Analyze business requirements and design a LAN structure to meet those requirements.
	04.12	Discuss quality-of-service considerations and switching prioritization.
05.0	Demonstrate VLAN configuration skills. – The student will be able to:	
	05.01	Perform and verify initial LAN switch configuration tasks including remote access management, switch port modes, and trunks.
	05.02	Configure, verify, and troubleshoot VLANs on a LAN switch.

05.03	Implement a VLAN Domain by configuring LAN switches for VTP network operation.
05.04	Configure a router to provide Inter-VLAN routing using multiple physical interfaces, and on a single physical interface with sub-interfaces.
05.05	Configure and troubleshoot STP and its variants on a switched network environment.
05.06	Configure and verify the bridge to optimize STP.
05.07	Establish and configure port priorities.
05.08	Troubleshoot and resolve issues with STP operations.
05.09	Manage router and switch OS software.
06.0	Demonstrate an understanding of basic wireless concepts and configuration. – The student will be able to:
06.01	Describe standards associated with wireless media, including IEEE, Wi-Fi Alliance, and ITU/FCC standards.
06.02	Identify and describe the purpose of the components in a small wireless network such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS).
06.03	Perform a site survey and identify common implementation issues.
06.04	Identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points.
06.05	Configure and verify WLAN design and functionality.
06.06	Describe and configure wireless security, including Wi-Fi Protected Access (WPA).
06.07	Describe and troubleshoot common wireless-network implementation issues such as interference and misconfiguration.
07.0	Demonstrate an understanding of wide area networks (WAN). – The student will be able to:
07.01	Describe WAN and MAN topologies.
07.02	Differentiate between WAN and LAN topologies.
07.03	Identify and describe WAN protocols.
07.04	Describe the impact of applications (Voice Over IP, Video Over IP) on a network.
07.05	Identify major network issues associated with the Internet, intranets and extranets.
07.06	Explain the differences between the use of leased lines, packet-switched, and circuit-switched technologies.
07.07	Describe typical WAN links and discuss bandwidth considerations.
07.08	Identify and manage licensing.

08.0	Demonstrate WAN configuration skills. – The student will be able to:
08.01	Configure and verify Point-to-Point WAN connection.
08.02	Configure and verify a packet switched WAN connection.
08.03	Configure and verify a basic WAN serial connection, a PPP connection between routers, and Frame Relay.
08.04	Configure and verify a PPP connection between routers, and verify a Frame Relay between routers.
08.05	Troubleshoot WAN implementation issue.
08.06	Implement LAN/WAN connections, including virtual private networks (VPN), permanent virtual circuits (PVC), Frame Relay, tunneling, remote and mobile user access.
09.0	Demonstrate an understanding of network security. – The student will be able to:
09.01	Implement basic switch security measures such as port security, trunk access, and management VLANs.
09.02	Identify current network security threats and explaining how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications.
09.03	Describe the functions of common security appliances and applications.
09.04	Implement recommended security practices to secure network devices.
09.05	Discuss the functions of authentication servers.
09.06	Describe the function and use of Access Control Lists (ACLs).
09.07	Verify, monitor, and troubleshoot ACLs in a network environment.
10.0	Demonstrate an understanding of remote access. – The student will be able to:
10.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
10.02	Configure static and dynamic routing, Network Address Translation (NAT) and Internet Connection Sharing (ICS).
10.03	Configure remote access services, protocols and policies, conditions and settings.
10.04	Configure remote access Dial-In User Service (RADIUS).
10.05	Configure wireless clients with Group Policy.
10.06	Monitor and troubleshoot remote access and wireless connections.
11.0	Demonstrate an understanding of IP addressing services. – The student will be able to:
11.01	Describe the purpose and operation of DHCP and DNS in a networked environment.
11.02	Configure, verify, and troubleshoot DHCP and DNS operation on a router.

	11.03	Describe the operation and use of NAT and Port Address Translation (PAT) to provide Internet access to Private IP Address networks.
	11.04	Configure, verify, and troubleshoot NAT on a router, including static translation, use of IP Address pools, and sharing a public IP address on a router interface.
	11.05	Describe the purpose and operation of IPv6.
	11.06	Configure, verify, and troubleshoot IPv6 routing in a network.
12.0	Demonstrate an understanding of network maintenance, support and troubleshooting. – The student will be able to:	
	12.01	Identify, interpret and maintain network documentation, procedures and practices.
	12.02	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
	12.03	Follow standard operating procedures for troubleshooting hardware and software.
	12.04	Manage, maintain and backup router and switch system and configuration files.
	12.05	Recognize and resolve hardware and software configuration problems.
	12.06	Identify and resolve common network problems at Layers 1, 2, 3, and 7 using a layered model approach. Describe the use and features of diagnostic test equipment.
	12.07	Determine type of programs and procedures required to: baseline network performance, identify intrusion and unacceptable system use, identify performance issues, predict system failures, and optimize network availability.
	12.08	Use network monitoring and management tools effectively to integrate and manage network resources.
	12.09	Explain RMON and SNMP and their use in monitoring a network.
	12.10	Configure network devices to send SNMP traps or alerts to network management systems.
	12.11	Establish and document a network baseline.
	12.12	Compare and analyze initial performance measurements with the availability of critical network devices and connections to determine the difference between abnormal behavior and proper network performance as the network grows or traffic patterns change.
	12.13	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.

Additional Information

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Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Florida Department of Education
Curriculum Framework

Program Title: **Network Virtualization**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100116
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 24 credit hours; Secondary: 18 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of virtualization concepts.
02.0 Install and configure the virtualization server platform.
03.0 Install, configure and manage virtualized clients.
04.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: **Network Virtualization**
CIP Number: **0511100116**
Program Length: **Primary: 18 credit hours; Secondary: 24 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (15111001112). At the completion of this program, the student will be able to:
01.0 Demonstrate an understanding of virtualization concepts. – The student will be able to:
01.01 Describe the purpose and uses of computer virtualization.
01.02 Identify and describe virtualization products, applications and services.
01.03 Identify compatibility issues among hardware and software products.
01.04 Describe the key features of virtualization software.
01.05 Identify the elements necessary for a Virtual Desktop Infrastructure.
01.06 Explain the benefits and considerations for virtual storage, including local host disk, iSCSI SAN, Fibre Channel SAN, and NFS SAN.
01.07 Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
01.08 Describe backup, recovery, disaster recovery, business continuity, and replication concepts.
01.09 Describe the policies and profile management which restrict and allow features.
01.10 Identify and modify desktop catalogs, groups, and a master virtual machine.
02.0 Install and configure the virtualization server platform. – The student will be able to:
02.01 Install and configure the virtualization platform using Windows and Linux-based applications.
02.02 Install and configure the virtualization environment to create a new farm or join an existing farm.
02.03 Automate virtual machine and cluster deployment.
02.04 Monitor and maintain license usage requirements and trends.
02.05 Manage virtualization networking and storage.

	02.06 Manage user sessions from the administrative console.
	02.07 Configure network connectivity and storage for the virtualization software.
03.0	Install, configure and manage virtualized clients. – The student will be able to:
	03.01 Identify requirements for virtual machines according to task.
	03.02 Configure the virtual environment and the virtual machine properties.
	03.03 Install, configure and manage a virtual machine desktop client.
	03.04 Install, configure and manage a virtualized server.
	03.05 Manually deploy and migrate virtual machines.
	03.06 Configure and assign users to pooled virtual desktops and dedicated virtual desktops.
	03.07 Convert physical machines to virtual machines.
	03.08 Configure desktop resources for access by users.
	03.09 Configure and monitor back up virtual machine data to shared storage.
	03.10 Migrate, convert, and monitor virtual machines.
	03.11 Create and update shared disks.
	03.12 Optimize the end user experience.
04.0	Demonstrate employability skills. – The student will be able to:
	04.01 Conduct a job search.
	04.02 Secure information about a job.
	04.03 Identify documents that may be required when applying for a job.
	04.04 Complete a job application form correctly.
	04.05 Demonstrate competence in job interview techniques.
	04.06 Demonstrate knowledge of how to make appropriate decisions.
	04.07 Demonstrate appropriate work/behavioral habits.
	04.08 Demonstrate acceptable employee personal hygiene and health.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Information & Communications Technology (ICT) Essentials**
Program Type: **Orientation/Exploratory**
Career Cluster: **Information Technology**

Secondary – Middle School	
Program Number	9009100
CIP Number	149009100M
Grade Level	6-8
Standard Length	Year
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G WEB DEV 7G
CTSO	FBLA BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to provide students with the computer, digital, and information technology skills necessary for success in their future academic and occupational goals. In addition to fundamental computer information, the content includes but is not limited to digital technologies associated with web development, multimedia, word processing, spreadsheet, database, Internet communications, cybersecurity, and computer programming.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Florida Standards for English Language Development (ELD)
English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of the courses shown in the table below. For optimal success, it is recommended that students' progress through the program in the order presented.

Course Number	Course Title	Course Length
9009110	Information & Communications Technology (ICT) Essentials 1	Year
9009120	Information & Communications Technology (ICT) Essentials 2	Year
9009130	Information & Communications Technology (ICT) Essentials 3	Year

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Identify computer components and their functions.
02.0 Demonstrate knowledge of different operating systems.
03.0 Demonstrate an understanding of Internet safety and ethics.
04.0 Demonstrate proficiency using the Internet to locate information.
05.0 Demonstrate proficiency in using word processing software.
06.0 Demonstrate proficiency in using presentation software.
07.0 Demonstrate proficiency in using graphics software.
08.0 Demonstrate appropriate use of email.
09.0 Demonstrate knowledge of safety and privacy practices for online communication.
10.0 Develop and apply fundamental spreadsheet skills.
11.0 Develop and apply database skills.
12.0 Demonstrate skill in using video editing software and equipment.
13.0 Demonstrate proficiency in using audio editing software (e.g., Audacity).
14.0 Demonstrate proficiency locating, gathering, and preparing textual, graphical, and image-based web content.
15.0 Use Web 2.0 or Internet-based collaborative technology (e.g., Wikis, Wimba, Moodle, Edmodo, Facebook, Schoology, Gaggle) to facilitate a web development or research project.
16.0 Demonstrate an understanding of computer networks.
17.0 Demonstrate proficiency in web page development.
18.0 Demonstrate proficiency in game development.
19.0 Demonstrate proficiency in basic programming.

Florida Department of Education
Student Performance Standards

Course Title: **Information & Communications Technology (ICT) Essentials 1**
Course Number: **9009110**
Course Length: **Year**
Grade: **6-8**

Course Description:

This course introduces students to core concepts associated with computers and their use. The content includes hands-on opportunities to explore various software applications, including the creation of a template-based webpage and a basic computer program. For the programming instruction, the use of Alice from Carnegie Mellon University is encouraged as it is a highly engaging program, includes instructional materials, and is available at no cost.

CTE Standards and Benchmarks	
01.0	Identify computer components and their functions. – The student will be able to:
01.01	Describe what defines a computer and ways a computer can be used.
01.02	Identify the internal components of a computer (e.g., case, CPU, RAM, power supply, hard drive, motherboard, expansion cards, cabling).
01.03	Identify and know how to connect various computer input devices (e.g., mouse, keyboard, phone, camera, scanner, microphone, game controller, stylus, barcode reader finger print scanner, GPS device, touch pad, graphics tablet) and describe their use.
01.04	Identify and know how to connect various computer output devices (e.g., monitor, printer, projector, speakers, headphones) and describe their use.
01.05	Identify and know how to connect various storage devices (e.g., flash drive, external hard drive (SSD, network drive), memory card, discs, cloud).
02.0	Demonstrate knowledge of different operating systems. – The student will be able to:
02.01	Compare and contrast various operating systems used in a computer and mobile devices (i.e., Windows, OS (Apple), UNIX, Android, iOS).
02.02	Describe and use conventional file naming conventions.
02.03	Demonstrate proficiency with file management tasks (e.g., folder creation, file creation, backup, copy, delete, open, save).
02.04	Be able to identify file types by extension (e.g., .doc, .txt, .wav, xls).

	02.05 Demonstrate proficiency in using gadgets, icons, and taskbars and other pre-loaded operating system programs. (e.g., calculator, text editor, clock, volume controls, adding icons and shortcuts to taskbar and shortcut menus).
03.0	Demonstrate an understanding of Internet safety and ethics. – The student will be able to:
	03.01 Describe risks associated with social networking sites (e.g., FaceBook, Snapchat, Instagram, Twitter) and ways to reduce these risks.
	03.02 Define “privacy” and relate it to the term “digital footprint.”
	03.03 Practice cybersafety techniques to protect your personal information when using internet searches, email, chat rooms, and social network websites.
	03.04 Describe cyberbullying, its impact on perpetrators and victims and ways to respond.
	03.05 Describe risks associated with sexting (including legal issues, social consequences), and discuss methods for response, reporting, and prevention.
	03.06 Describe risks associated with online gaming, and identify ways to reduce these risks.
	03.07 Discuss issues related to downloading music or videos from the Internet, including unethical vs. illegal actions.
	03.08 Compare and contrast rules for copyright and fair use, especially in relation to using online resources for school and educational purposes.
	03.09 Distinguish between viruses and malware and discuss their impact on personal privacy and computer operation.
	03.10 Describe common threats used to spread malware and viruses, including phishing, pharming, Trojans, spyware, malicious sites, “free” downloads.
	03.11 Perform an antivirus scan on a computer system to check for viruses and malware.
	03.12 Describe strong password practices.
	03.13 Practice cyber safety techniques to protect your computer system when using Internet searches, email and social network websites.
	03.14 Identify security issues related to mobile phones, including personal information compromised if a phone is lost or stolen.
	03.15 Adhere to Acceptable Use Policies when accessing the Internet.
04.0	Demonstrate proficiency using the Internet to locate information. – The student will be able to:
	04.01 Identify and use web terminology (WWW, Web Browser, Internet, Web Server, Web Page, Address Bar, Hyperlinks, Navigation Buttons, Search Bar, Bookmarks/Favorites, Tab, Downloading, Plug-ins, Social Media Plug-ins).
	04.02 Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).
	04.03 Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).
	04.04 Demonstrate proficiency using search engines, including Boolean search techniques.

	04.05	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).
	04.06	Compare and contrast the roles of web servers and web browsers.
	04.07	Evaluate online information for relevance, credibility and quality using basic guidelines and indicators (e.g. authority, affiliation, purpose, bias, date).
	04.08	Identify and apply copyright and fair use guidelines, and explain plagiarism as an ethical and legal violation.
	04.09	Incorporate results from Internet searches into a research project (e.g., report, summary).
	04.10	Download images as needed to support a research project, complying with copyright notices.
	04.11	Properly cite Internet sources used to obtain information for a research project.
05.0	05.0	Demonstrate proficiency in using word processing software. – The student will be able to:
	05.01	Describe the general functions of word-processing software, including benefits for document creation, commonly used word-processing applications.
	05.02	Define the term “cloud computing,” and explain benefits of creating and storing word-processing documents online.
	05.03	List and describe common word processor interface tools and features.
	05.04	Identify common keyboard shortcuts used in word processors, and explain the benefits of using shortcuts.
	05.05	Format the page setup of a document, including margins, line spacing, indents, headers vs. footers, orientation.
	05.06	Explain printing options in a word processor, including shrink-to-fit, 2-sided printing, and document orientation.
	05.07	Copy, paste and move text within a document using mouse, menu and keyboard techniques.
	05.08	Copy, paste and move text among multiple documents using mouse, menu and keyboard techniques.
	05.09	Modify document view settings to display close-up, single and multiple pages.
	05.10	Define the term “format” as it relates to word processing.
	05.11	Format text using styles and font tools in a word processor.
	05.12	Format a document using multi-level heading styles to enable an outline view (e.g. document map, navigation pane) in a word processor.
	05.13	Create a table of contents using auto-generation tools and techniques in a word processor.
	05.14	Insert page breaks in a document.

05.15	Create source citations and/or a bibliography in a document.
05.16	Insert a current date and time stamp into a document.
05.17	Use word processor tools to determine the number of pages, words and characters in a document.
05.18	Use spell check, grammar check, thesaurus, and find & replace to edit a document.
05.19	Insert and modify sizing of images in a word-processing document.
05.20	Position an image relative to text in a document, using various text-wrapping options (inline, square, tight).
05.21	Use word-processing drawing tools to create pre-formatted shapes that enhance a document's content.
05.22	Use word-processor drawing tools to create a visual representation of information (e.g. SmartArt), such as diagram, flow chart.
05.23	Apply a column layout to text in a document as appropriate for the content (e.g., article, newsletter).
05.24	Apply simple numbered and bulleted lists in a document to make content easier to read and understand.
05.25	Format numbered and bulleted lists to produce multi-level outline in a document.
05.26	Create a simple brochure and/or flyer using a template.
05.27	Create a table in a word-processing document, and enter and move data in the table.
05.28	Convert a body of text into a table structure in a document to make content easier to read and understand.
05.29	Define "collaboration" and explain ways that users can collaborate on word-processing documents, including installed software vs. cloud-based software, real-time collaboration, auto save, sharing tools, revision history.
05.30	Use the translation tool in a word processor to translate text in a document from English into another language, and vice versa.
05.31	Add comments to a document when reviewing and/or editing content.
05.32	Revise a document using editing tools (e.g. Track Changes) in a word processor, and accept or reject changes as appropriate.
06.0	Demonstrate proficiency in using presentation software. – The student will be able to:
06.01	Describe presentation software and the ways it can be used.
06.02	Create and/or modify a "slide master" or template to apply a consistent appearance to a presentation.
06.03	Add and format titles, subtitles and talking points in presentation slides.
06.04	Add slide numbers and/or date and time codes to presentation slides.

06.05	Insert and format images/graphics in presentation slides.
06.06	Insert new or duplicate slides in a presentation.
06.07	Modify slide transitions in a presentation to include animation.
06.08	Insert and/or modify sound settings and timing in a presentation.
06.09	Modify the sequence of slides in a presentation.
06.10	Produce a presentation that includes text, graphics and images, and present it.
06.11	Modify a presentation's setup to repeat (i.e., loop) the presentation continuously.
07.0	Demonstrate proficiency in using graphics software. – The student will be able to:
07.01	Describe graphics software and the ways it can be used.
07.02	Compare and contrast vector and raster images.
07.03	Identify image file formats for photos and graphical art (e.g., TIFF, BMP, PSD, EPS, JPEG, GIF, PNG), and specify which formats are supported on the Web.
07.04	Define terms related to the creation and display of graphical images (e.g., raster, vector, transparency, opacity, cropping, lasso, magic wand, marquee, canvas size, flattened, blur, dodge, sharpen, staking order, free transform, lossless, adjustments, move, clone, zoom, layers, filter, distort).
07.05	Create images with effects using different tools, brushes, adjustments and filters available in graphics software.
07.06	Copy and paste graphical images.
07.07	Modify shapes and colors in a graphical image.
07.08	Save and export a digital photograph in a format that provides the best image quality and file size for Internet use.
07.09	Create a progressive slide presentation using graphical design/layout template features (e.g., SmartArt) and animated transitions.
07.10	Use a portable digital video device (e.g., mobile phone, flip camera) or similar online tools to shoot video files, and transfer them to a computer.
07.11	Use video-editing software to produce a slide show or movie.
07.12	Create a multimedia presentation that incorporates edited video, animation, music and/or narration, and that applies principles of good design, smooth transitions and effective message delivery.
08.0	Demonstrate appropriate use of email. – The student will be able to:
08.01	Define "email "and describe the functions and advantages as a form of communication.

08.02	Identify components of an email message.
08.03	Explain the format of an email address (i.e., user name, @ symbol, domain).
08.04	Attach a file to an email message.
08.05	Reply to and forward an email message to one or more addressees.
08.06	Use the Internet to perform email activities (i.e., web-based email).
08.07	Identify the appropriate use of email and demonstrate related email etiquette.
08.08	Perform email organization and cleanup (e.g., trash, flags, create folders).

Florida Department of Education
Student Performance Standards

Course Title: **Information & Communications Technology (ICT) Essentials 2**
Course Number: **9009120**
Course Length: **Year**
Grade: **6-8**

Course Description:

This course builds on the previous course and provides greater depth and more complex concepts and the skills/knowledge to master these concepts. Students will be provided opportunities to extend their skills with various software applications by creating more complex documents and using more complex functions. Students will also be exposed to structured programming and the creation of a more complex computer program. For the programming instruction, the use of Alice from Carnegie Mellon University is encouraged as it is a highly engaging program, includes instructional materials, and is available at no cost.

CTE Standards and Benchmarks	
09.0	Demonstrate knowledge of safety and privacy practices for online communication. The student will be able to:
09.01	Define “privacy” and relate it to the term “digital footprint.”
09.02	Describe the risks of communicating on social networking sites (e.g. Facebook, Twitter, Instagram) and identify ways to communicate safely.
09.03	Distinguish between copyright infringement, plagiarism and fair use in an educational setting and in relation to school projects, especially with music and pictures.
09.04	Describe online communication practices that contribute to cyberbullying.
09.05	Practice safe online communication techniques with Internet searches, email, chat rooms, and other social network Web sites.
09.06	Follow an Acceptable Use Policy (AUP) when accessing the Internet.
10.0	Develop and apply fundamental spreadsheet skills. – The student will be able to:
10.01	Define “spreadsheet” and describe ways it may be used.
10.02	Identify the parts of the spreadsheet display, including cells, columns and rows, cell references, cell range.
10.03	Create and navigate through multiple spreadsheets in a file.

CTE Standards and Benchmarks	
10.04	Insert and format various types of data (text, numeric, date/time) in a spreadsheet cells.
10.05	Select multiple cells, including adjacent and non-adjacent ranges, using mouse and keyboard techniques.
10.06	Cut, copy, and paste information from one or more cells to another part of the spreadsheet.
10.07	Use the undo and redo tools in a spreadsheet.
10.08	Apply and modify cell formatting for currency, date and percentage values.
10.09	Resize column width and row height in a spreadsheet.
10.10	Insert and delete columns and rows in a spreadsheet.
10.11	Merge and unmerge cells in a spreadsheet.
10.12	Apply shading and borders to a spreadsheet.
10.13	Describe the purpose of a table and how it relates to a spreadsheet.
10.14	Create and print a table and/or range that displays and sums the values of different data types.
10.15	Identify various types of charts (e.g., line, bar, pie, scatter) and common chart components (e.g., vertical axis, horizontal axis, legend), and explain when to use each chart type.
10.16	Create a chart from existing data and format the pieces (data set), change the background color, and add appropriate titles and a legend.
10.17	Use the auto sum function to calculate the values of multiple cells.
10.18	Insert common functions (SUM, AVERAGE, COUNT, MAX, MIN) and simple mathematical formulas which include addition, subtraction, multiplication, or division into a spreadsheet.
10.19	Distinguish between absolute and relative cell references in a spreadsheet.
10.20	Use the sort function to organize information numerically or alphabetically, including multiple levels of sorting.
10.21	Use the filter function to display spreadsheet data based on specific criteria.
10.22	Use conditional formatting to highlight text in a spreadsheet.
11.0	Develop and apply database skills. – The student will be able to:
11.01	Define database and describe real-world uses (e.g. search engines, schools, drivers licenses & car registrations, hospitals, retail, law enforcement).

CTE Standards and Benchmarks
11.02 Distinguish between databases and spreadsheets.
11.03 Identify advantages of using a database instead of alternatives (e.g., spreadsheets, electronic documents, paper).
11.04 Define “Big Data” and describe how it is used in advertising.
11.05 Identify the components of a database.
11.06 Distinguish between fields and records in a database.
11.07 Describe the basic data types and formats used in a database.
11.08 Distinguish between a table and a query.
11.09 Identify database keys, including primary and foreign.
11.10 Identify the relationships between tables in databases (i.e., one-to-one, one-to-many, many-to-many).
11.11 Distinguish between a query and a report.
11.12 Identify various report types.
11.13 Describe Structured Query Language (SQL) and discuss its use with databases.
11.14 Identify and compare various database applications, including Microsoft Access, MySQL, Oracle.
11.15 Create a database table that uses multiple data types.
11.16 Add, Edit, and Delete records from a database table.
11.17 Sort records in a database query or table.
11.18 Troubleshoot common database errors, including data type errors, query syntax errors.
11.19 Create a basic select query in one table.
11.20 Create an action query to manipulate data.
11.21 Create a query using primary and foreign keys.
11.22 Create a simple table join.
11.23 Import and export data from a database into a spreadsheet.

CTE Standards and Benchmarks	
	11.24 Create relevant reports from a database.
12.0	Demonstrate skill in using video editing software and equipment. – The student will be able to:
	12.01 Demonstrate ability to operate a video camera (e.g., Flip camera, cell phone).
	12.02 Write storyboards to depict a one minute video segment.
	12.03 Determine appropriate lighting needs.
	12.04 Create video shots sufficient to produce a one minute video.
	12.05 Identify the functions and benefits of the digital video software interface.
	12.06 Demonstrate ability to edit, cut, erase, and insert video.
	12.07 Edit video as needed to achieve desired message and length.
	12.08 Describe a first complete run-through of the video production process.
	12.09 Characterize the qualities of effective communication in a completed video.
	12.10 Upload finished video files to a website.
13.0	Demonstrate proficiency in using audio editing software (e.g., Audacity). – The student will be able to:
	13.01 Identify the functions and benefits of the audio editing software interface.
	13.02 Demonstrate ability to edit, cut, erase, and insert audio.
	13.03 Edit audio as needed to achieve desired message and length.
	13.04 Prepare a 30 second to 1 minute audio commercial project.
14.0	Demonstrate proficiency locating, gathering, and preparing textual, graphical, and image-based web content. – The student will be able to:
	14.01 Define the elements of a webpage and what makes a good webpage.
	14.02 Describe effective text and image content for Web pages based on how visitors use the Web.
	14.03 List guidelines and conventions for effective text on Web page.
	14.04 Explain the inverted pyramid model of newspaper journalism and how it applies to Web content.

CTE Standards and Benchmarks	
14.05	Use word-processing software to create effective written content for a Web page.
14.06	Create and/or edit message-driven image content for a Web page using graphics software.
14.07	Access graphics through various recourses (e.g., scanner, digital camera, CD-ROM, clipart, copyright-free online graphics).
14.08	Plan the content and design of a basic Web page using strategies for effective Web communication, including brainstorming, determining audience, choosing content and media types, using white space.

Florida Department of Education
Student Performance Standards

Course Title: **Information & Communications Technology (ICT) Essentials 3**
Course Number: **9009130**
Course Length: **Year**
Grade: **6-8**

Course Description:

This course builds on the previous two courses and provides greater depth and more complex concepts and the skills/knowledge to master these concepts. In addition to working with network concepts, students will be provided opportunities to further extend their skills with various software applications by creating more complex documents and using more complex functions and technologies. Students will continue their exposure to computer programming and the creation of more complex computer programs. For the programming instruction, the use of Alice from Carnegie Mellon University is encouraged as it is a highly engaging program, includes instructional materials, and is available at no cost.

CTE Standards and Benchmarks	
15.0	Use Web 2.0 or Internet-based collaborative technology (e.g., Wikis, Wimba, Moodle, Edmodo, Facebook, Schoology, Gaggle) to facilitate a web development or research project. – The student will be able to:
15.01	Create and use a collaborative environment for communicating and sharing among project team members.
15.02	Create and use a social media page (e.g., Wikis, Wimba, Moodle, Edmodo, Facebook, Schoology, Gaggle) to share and publish project components (e.g., content, images, graphics, videos) for gauging visitor reaction and obtaining feedback.
16.0	Demonstrate an understanding of computer networks. – The student will be able to:
16.01	Define “network” and give examples of networks used at home, school, and work.
16.02	Compare types of networks, including LAN, WAN, MAN, VPN, intranet, extranet, the Internet.
16.03	Compare common network topologies, including bus, star, ring, mesh.
16.04	Compare various network models and their advantages, including client/server, mainframe/terminal, peer-to-peer.
16.05	Compare various methods and media for network connections, including broadband, wireless, Bluetooth, cellular, satellite.
16.06	Describe the functions of various network hardware devices, including NIC, hub, switch, router, bridge, gateway, access point.
16.07	Describe the purpose of protocols, and identify the protocols commonly used in networks, including TCP/IP, DHCP, DNS, HTTP, FTP, IMAP, POP, SMTP.

CTE Standards and Benchmarks	
16.08	Describe the purpose and function of IP addressing and distinguish between public and private IP addresses.
16.09	Describe the OSI reference model and its layers, including tracing the flow of data between two network nodes through the OSI layers.
17.0	Demonstrate proficiency in web page development. – The student will be able to:
17.01	Identify website domains, and relate a site's domain to its purpose.
17.02	Relate basic components of a webpage (e.g. color, space, written content, typography, images, links, multimedia) to aesthetic, functional and/or usable design principals.
17.03	Define aesthetic design, and explain how aesthetics can affect a visitors' perception of a website's information.
17.04	Demonstrate knowledge of color wheel concepts and effective use of color on a website.
17.05	Compare functional and usable design principles, and explain how usability can affect a website's success.
17.06	Critique the aesthetic design, usability and accessibility of sample websites.
17.07	Define multimedia, and identify its role in webpage interactivity.
17.08	Explain the primary steps of the website planning process.
17.09	Apply the website planning process to plan the design for basic website.
17.10	Build the site navigation scheme for a website.
17.11	Compare webpage creation using an HTML text editor to using a graphical user interface (GUI) editor.
17.12	Compare website creation using an online site builder, an offline site builder and a content management system (CMS).
17.13	Modify an existing webpage template to create an effective look and feel for a website.
17.14	Create a website using a template.
17.15	Define "HTML (Hypertext Markup Language)" and related terms, including tag vs. element, container vs. empty tag, block-level vs. inline element, attribute value, semantic tag.
17.16	Identify HTML elements required to create webpage structure.
17.17	Create webpages using basic HTML tags (e.g., headings, lists, character styles, text alignment, tables, comments).
17.18	Use HTML to create hyperlinks to external sites.

CTE Standards and Benchmarks
17.19 Use HTML to insert common image file formats into webpages, and use an image as a hyperlink.
17.20 Explain Cascading Style Sheet (CSS) technology.
17.21 Apply CSS styles to an HTML page.
17.22 Create and/or edit animation files, and integrate them into a webpage.
17.23 Create and/or edit video files, and integrate them into a webpage.
17.24 Use Dynamic HTML (DHTML) to enhance webpage interactivity.
17.25 Create and use a wiki or similar tool for collaborating among project team members.
17.26 Create and use a social media page (e.g., Facebook, Wimba, Edmodo) and/or a blog to share content and collaborate on projects.
17.27 Review webpage content, verify copyright restrictions, and create meta-data before publishing a site to the internet.
17.28 Test webpages for display, functionality, and accessibility before publishing a site to the Internet.
17.29 Validate webpage code using W3C validation tools before publishing a site to the Internet.
17.30 Describe network issues relating to websites, including bandwidth, compression, streaming, web hosting.
17.31 Explain the purpose of File Transfer Protocol (FTP) in accessing information on the Internet.
17.32 Publish a website using FTP.
17.33 Describe website security methods, including secure server vs. unsecured served, SSL, SSH, encryption.
18.0 Demonstrate proficiency in game development. – The student will be able to:
18.01 Describe the role of games in modern society (e.g., education, task training, social networking, therapy, recreation).
18.02 Identify various types of games (e.g., chance, skill, knowledge, role-playing, and storytelling).
18.03 Identify the steps of the design process for creating a game.
18.04 Apply the design process to solving a problem.
18.05 Analyze (deconstruct) existing games.
18.06 Identify the tools and skills needed for creating games.

CTE Standards and Benchmarks	
18.07	Identify design criteria and constraints.
18.08	Create storyboards to model a game's program flow and functionality.
18.09	Identify the programmer's role in creating games.
18.10	Identify common programming languages and applications used to create computer games.
18.11	Compare sequential, iteration (loop) and selection programming structures.
18.12	Define the term algorithm (i.e., a set of repeatable steps) and how it applies to problem solving.
18.13	Create an algorithm to solve a problem or complete a task.
18.14	Use pseudo-code to model a game program's flow.
18.15	Define logic errors and identify them in a game program or model.
18.16	Explain the types and uses of variables in game programming.
18.17	Describe basic Boolean concepts, including logical operators, order of precedence, expressions.
18.18	Describe the use of events, event handlers and functions in game programming.
18.19	Describe the use of parameters and arguments in game programming.
18.20	Describe the use of objects, classes and instances in game programming.
18.21	Describe the use of properties and methods with objects in game programming.
18.22	Write appropriate code to create a simple game using structured programming.
18.23	Test and evaluate the game program you created.
18.24	Modify the game program as needed to solve a problem.
18.25	Create an animated object (i.e., sprite) to be used in a game program.
18.26	Use programming code to control the behavior of an animated object (i.e., sprite) in a game program.
19.0	Demonstrate proficiency in basic programming. – The student will be able to:
19.01	Define "programming" and discuss its role in computing.

CTE Standards and Benchmarks	
19.02	Explain the binary representation of data and programs in computers.
19.03	Distinguish among the three types of programming languages (machine, assembly, high-level), and give examples.
19.04	Compare and contrast languages that are usually compiled (e.g., C++, Java) and interpreted (e.g., JavaScript, Python).
19.05	Describe the structure of a simple program, and explain why sequencing is important.
19.06	Write a program design document using pseudo-code that shows program flow.
19.07	Explain strategies used in problem-solving, and relate them to computer programming.
19.08	Define the term “algorithm,” and explain how it relates to problem-solving.
19.09	Explain the three types of programming errors (i.e., logic, syntax, runtime), and describe the forms of testing that can be used to locate and debug errors.
19.10	Solve a problem using logic by planning a strategy, designing and testing a hypothesis, and/or creating a set of step-by-step instructions to perform a task.
19.11	Define “structured programming” and discuss the advantages of this approach.
19.12	Define the three main programming control structures used in structured programming: sequential, selection (decision), and iteration (loops).
19.13	Describe iterative programming structures (e.g., while, do/while) and how they are used in programming.
19.14	Describe selection programming structures (e.g., if/then, else) and explain the logic used for if statements.
19.15	Write a simple program in pseudo-code that uses structured programming to solve a problem.
19.16	Explain the types and uses of variables in programming.
19.17	Explain basic object-oriented concepts.
19.18	Describe fundamental Boolean concepts, including Boolean algebra, operators, logic.
19.19	Create animated objects using a high-level programming environment (e.g., Alice, Greenfoot) to control their behavior.
19.20	Create a simple program that uses animated objects.
19.21	Convert a simple program from pseudo-code into a common high-level programming environment (e.g. Alice, Greenfoot).
19.22	Troubleshoot and debug errors in code.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Course Title: **Exploring Information Technology Careers**
Course Type: **Orientation/Exploratory**
Career Cluster: **Information Technology**

Secondary – Middle School	
Course Number	9009350
CIP Number	149009350M
Grade Level	6-8
Standard Length	Semester
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7 G WEB DEV 7 G DIGI MEDIA 7 G CYBER TECH 7 G COMP PROG 7 G
CTSO	FBLA BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Information Technology career cluster. The content includes but is not limited to terminology, careers, history, required skills, and technologies associated with pathways comprising the Information Technology career cluster. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Additional Information relevant to this Career and Technical Education (CTE) course is provided at the end of this document.

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Demonstrate an understanding of the Network Systems career pathway.
02.0 Demonstrate an understanding of the Information Support and Services career pathway.
03.0 Demonstrate an understanding of the Web and Digital Communications career pathway.
04.0 Demonstrate an understanding of the Programming and Software Development career pathway.
05.0 Apply leadership and communication skills.
06.0 Describe how information technology is used in the Information Technology career cluster.
07.0 Use information technology tools.

Florida Department of Education
Student Performance Standards

Course Title: **Exploring Information Technology Careers**
Course Number: **9009350**
Course Length: **Semester**

Course Description:

Beginning with a broad overview of the Information Technology career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the Information Technology career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the Network Systems career pathway. – The student will be able to:
01.01	Define and use proper terminology associated with the Network Systems career pathway.
01.02	Describe some of the careers available in the Network Systems career pathway.
01.03	Identify common characteristics of the careers in the Network Systems career pathway.
01.04	Research the history of the Network Systems career pathway and describe how the associated careers have evolved and impacted society.
01.05	Identify skills required to successfully enter any career in the Network Systems career pathway.
01.06	Describe technologies associated in careers within the Network Systems career pathway.
02.0	Demonstrate an understanding of the Information Support and Services career pathway. – The student will be able to:
02.01	Define and use proper terminology associated with the Information Support and Services career pathway.
02.02	Describe some of the careers available in the Information Support and Services career pathway.
02.03	Identify common characteristics of the careers in the Information Support and Services career pathway.
02.04	Research the history of the Information Support and Services career pathway and describe how the careers have evolved and impacted society.
02.05	Identify skills required to successfully enter any career in the Information Support and Services career pathway.
02.06	Describe technologies associated in careers within the Information Support and Services career pathway.

CTE Standards and Benchmarks	
03.0	Demonstrate an understanding of the Web and Digital Communications career pathway. – The student will be able to:
03.01	Define and use proper terminology associated with the Web and Digital Communications career pathway.
03.02	Describe some of the careers available in the Web and Digital Communications career pathway.
03.03	Identify common characteristics of the careers in the Web and Digital Communications career pathway.
03.04	Research the history of the Web and Digital Communications career pathway and describe how the careers have evolved and impacted society.
03.05	Identify skills required to successfully enter any career in the Web and Digital Communications career pathway.
03.06	Describe technologies associated in careers within the Web and Digital Communications career pathway.
04.0	Demonstrate an understanding of the Programming and Software Development career pathway. – The student will be able to:
04.01	Define and use proper terminology associated with the Programming and Software Development career pathway.
04.02	Describe some of the careers available in the Programming and Software Development career pathway.
04.03	Identify common characteristics of the careers in the Programming and Software Development career pathway.
04.04	Research the history of the Programming and Software Development career pathway and describe how the careers have evolved and impacted society.
04.05	Identify skills required to successfully enter any career in the Programming and Software Development career pathway.
04.06	Describe technologies associated in careers within the Programming and Software Development career pathway.
05.0	Apply leadership and communication skills. – The student will be able to:
05.01	Discuss the establishment and history of the FBLA/BPA student organizations.
05.02	Identify the characteristics and responsibilities of organizational leaders.
05.03	Demonstrate parliamentary procedure skills during a meeting.
05.04	Participate on a committee which has an assigned task and report to the class.
05.05	Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
05.06	Use a computer to assist in the completion of a project related to the Information Technology career cluster.
06.0	Describe how information technology is used in the Information Technology career cluster. – The student will be able to:
06.01	Identify information technology (IT) careers in the Information Technology career cluster, including the responsibilities, tasks and

CTE Standards and Benchmarks	
	skills they require.
06.02	Relate information technology project management concepts and terms to careers in the Information Technology career cluster.
06.03	Manage information technology components typically used in professions of the Information Technology career cluster.
06.04	Identify security-related ethical and legal IT issues faced by professionals in the Information Technology career cluster.
07.0	Use information technology tools. – The student will be able to:
07.01	Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the Information Technology career cluster.
07.02	Use e-mail clients to send simple messages and files to other Internet users.
07.03	Demonstrate ways to communicate effectively using Internet technology.
07.04	Use different types of web search engines effectively to locate information relevant to the Information Technology career cluster.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Course Title: **Exploring Information Technology Careers and Career Planning**
Course Type: **Orientation/Exploratory**
Career Cluster: **Information Technology**

Secondary – Middle School	
Course Number	9009360
CIP Number	149009360M
Grade Level	6-8
Standard Length	Semester
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7 G WEB DEV 7 G DIGI MEDIA 7 G CYBER TECH 7 G COMP PROG 7 G
CTSO	FBLA BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Information Technology career cluster. The content includes but is not limited to terminology, careers, history, required skills, and technologies associated with pathways comprising the Information Technology career cluster. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Additional Information relevant to this Career and Technical Education (CTE) course is provided at the end of this document.

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Demonstrate an understanding of the Network Systems career pathway.
02.0 Demonstrate an understanding of the Information Support and Services career pathway.
03.0 Demonstrate an understanding of the Web and Digital Communications career pathway.
04.0 Demonstrate an understanding of the Programming and Software Development career pathway.
05.0 Apply leadership and communication skills.
06.0 Describe how information technology is used in the Information Technology career cluster.
07.0 Use information technology tools.

Listed below are the course outcomes that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes – The student will be able to:

08.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
09.0 Develop skills to locate, evaluate, and interpret career information.
10.0 Identify and demonstrate processes for making short and long term goals.
11.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
12.0 Understand the relationship between educational achievement and career choices/postsecondary options.
13.0 Identify a career cluster and related pathways that match career and education goals.
14.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
15.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Exploring Information Technology Careers and Career Planning**
Course Number: **9009360**
Course Length: **Semester**

Course Description:

Beginning with a broad overview of the Information Technology career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the Information Technology career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the Network Systems career pathway. – The student will be able to:
01.01	Define and use proper terminology associated with the Network Systems career pathway.
01.02	Describe some of the careers available in the Network Systems career pathway.
01.03	Identify common characteristics of the careers in the Network Systems career pathway.
01.04	Research the history of the Network Systems career pathway and describe how the associated careers have evolved and impacted society.
01.05	Identify skills required to successfully enter any career in the Network Systems career pathway.
01.06	Describe technologies associated in careers within the Network Systems career pathway.
02.0	Demonstrate an understanding of the Information Support and Services career pathway. – The student will be able to:
02.01	Define and use proper terminology associated with the Information Support and Services career pathway.
02.02	Describe some of the careers available in the Information Support and Services career pathway.
02.03	Identify common characteristics of the careers in the Information Support and Services career pathway.
02.04	Research the history of the Information Support and Services career pathway and describe how the careers have evolved and impacted society.
02.05	Identify skills required to successfully enter any career in the Information Support and Services career pathway.
02.06	Describe technologies associated in careers within the Information Support and Services career pathway.

CTE Standards and Benchmarks	
03.0	Demonstrate an understanding of the Web and Digital Communications career pathway. – The student will be able to:
03.01	Define and use proper terminology associated with the Web and Digital Communications career pathway.
03.02	Describe some of the careers available in the Web and Digital Communications career pathway.
03.03	Identify common characteristics of the careers in the Web and Digital Communications career pathway.
03.04	Research the history of the Web and Digital Communications career pathway and describe how the careers have evolved and impacted society.
03.05	Identify skills required to successfully enter any career in the Web and Digital Communications career pathway.
03.06	Describe technologies associated in careers within the Web and Digital Communications career pathway.
04.0	Demonstrate an understanding of the Programming and Software Development career pathway. – The student will be able to:
04.01	Define and use proper terminology associated with the Programming and Software Development career pathway.
04.02	Describe some of the careers available in the Programming and Software Development career pathway.
04.03	Identify common characteristics of the careers in the Programming and Software Development career pathway.
04.04	Research the history of the Programming and Software Development career pathway and describe how the careers have evolved and impacted society.
04.05	Identify skills required to successfully enter any career in the Programming and Software Development career pathway.
04.06	Describe technologies associated in careers within the Programming and Software Development career pathway.
05.0	Apply leadership and communication skills. – The student will be able to:
05.01	Discuss the establishment and history of the FBLA/BPA student organization.
05.02	Identify the characteristics and responsibilities of organizational leaders.
05.03	Demonstrate parliamentary procedure skills during a meeting.
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CTE Standards and Benchmarks	
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	07.01 Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the Information Technology career cluster.
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Listed below are the course outcomes that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes – The student will be able to:	
08.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
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11.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
12.0	Understand the relationship between educational achievement and career choices/postsecondary options.
13.0	Identify a career cluster and related pathways that match career and education goals.
14.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
15.0	Demonstrate knowledge of technology and its application in career fields/clusters.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

Career Planning

The requirements of section 1003.4156 (1) (e), Florida Statutes, have been integrated into this course. The statute requires that students take a career and education planning course that must result in a completed personalized academic and career plan for the student; must emphasize the importance of entrepreneurship skills; must emphasize technology or the application of technology in career fields; and, beginning in the 2014-2015 academic year, must provide information from the Department of Economic Opportunity's economic security report as described in section 445.07, Florida Statutes. For additional information on the Middle School Career and Education Planning course requirements, go to http://www.fldoe.org/workforce/ced/.

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Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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Additional Resources

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Florida Department of Education
Curriculum Framework

Program Title: **Information & Communications Technology (ICT) Essentials Careers and Career Planning**
Program Type: **Orientation/Exploratory**
Career Cluster: **Information Technology**

Secondary – Middle School	
Program Number	9009370
CIP Number	14900937MS
Grade Level	6-8
Standard Length	Year
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G WEB DEV 7G
CTSO	FBLA BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to provide students with the computer, digital, and information technology skills necessary for success in their future academic and occupational goals. In addition to fundamental computer information, the content includes but is not limited to digital technologies associated with web development, multimedia, word processing, spreadsheet, database, Internet communications, cybersecurity, and computer programming.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Florida Standards for English Language Development (ELD)
English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of the courses shown in the table below. For optimal success, it is recommended that students' progress through the program in the order presented.

Course Number	Course Title	Course Length
9009110	Information & Communications Technology (ICT) Essentials 1	Year
9009120	Information & Communications Technology (ICT) Essentials 2	Year
9009140	Information & Communications Technology (ICT) Essentials Careers and Career Planning	Year

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Identify computer components and their functions.
02.0 Demonstrate knowledge of different operating systems.
03.0 Demonstrate an understanding of Internet safety and ethics.
04.0 Demonstrate proficiency using the Internet to locate information.
05.0 Demonstrate proficiency in using word processing software.
06.0 Demonstrate proficiency in using presentation software.
07.0 Demonstrate proficiency in using graphics software.
08.0 Demonstrate appropriate use of email.
09.0 Demonstrate knowledge of safety and privacy practices for online communication.
10.0 Develop and apply fundamental spreadsheet skills.
11.0 Develop and apply database skills.
12.0 Demonstrate skill in using video editing software and equipment.
13.0 Demonstrate proficiency in using audio editing software (e.g., Audacity).
14.0 Demonstrate proficiency locating, gathering, and preparing textual, graphical, and image-based web content.
15.0 Use Web 2.0 or Internet-based collaborative technology (e.g., Wikis, Wimba, Moodle, Edmodo, Facebook, Schoology, Gaggle) to facilitate a web development or research project.
16.0 Demonstrate an understanding of computer networks
17.0 Demonstrate proficiency in web page development.
18.0 Demonstrate proficiency in game development.
19.0 Demonstrate proficiency in basic programming.

Listed below are the course outcomes that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes – The student will be able to:

20.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
21.0 Develop skills to locate, evaluate, and interpret career information.
22.0 Identify and demonstrate processes for making short and long term goals.
23.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
24.0 Understand the relationship between educational achievement and career choices/postsecondary options.
25.0 Identify a career cluster and related pathways that match career and education goals.
26.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
27.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Information & Communications Technology (ICT) Essentials 1**
Course Number: **9009110**
Course Length: **Year**
Grade: **6-8**

Course Description:

This course introduces students to core concepts associated with computers and their use. The content includes hands-on opportunities to explore various software applications, including the creation of a template-based webpage and a basic computer program. For the programming instruction, the use of Alice from Carnegie Mellon University is encouraged as it is a highly engaging program, includes instructional materials, and is available at no cost.

CTE Standards and Benchmarks	
01.0	Identify computer components and their functions. – The student will be able to:
01.01	Describe what defines a computer and ways a computer can be used.
01.02	Identify the internal components of a computer (e.g., case, CPU, RAM, power supply, hard drive, motherboard, expansion cards, cabling).
01.03	Identify and know how to connect various computer input devices (e.g., mouse, keyboard, phone, camera, scanner, microphone, game controller, stylus, barcode reader finger print scanner, GPS device, touch pad, graphics tablet) and describe their use.
01.04	Identify and know how to connect various computer output devices (e.g., monitor, printer, projector, speakers, headphones) and describe their use.
01.05	Identify and know how to connect various storage devices (e.g., flash drive, external hard drive (SSD, network drive), memory card, discs, cloud).
02.0	Demonstrate knowledge of different operating systems. – The student will be able to:
02.01	Compare and contrast various operating systems used in a computer and mobile devices (i.e., Windows, OS (Apple), UNIX, Android, iOS).
02.02	Describe and use conventional file naming conventions.
02.03	Demonstrate proficiency with file management tasks (e.g., folder creation, file creation, backup, copy, delete, open, save).
02.04	Be able to identify file types by extension (e.g., .doc, .txt, .wav, xls).

	02.05 Demonstrate proficiency in using gadgets, icons, and taskbars and other pre-loaded operating system programs. (e.g., calculator, text editor, clock, volume controls, adding icons and shortcuts to taskbar and shortcut menus).
03.0	Demonstrate an understanding of Internet safety and ethics. – The student will be able to:
	03.01 Describe risks associated with social networking sites (e.g., FaceBook, Snapchat, Instagram, Twitter) and ways to reduce these risks.
	03.02 Define “privacy” and relate it to the term “digital footprint.”
	03.03 Practice cybersafety techniques to protect your personal information when using internet searches, email, chat rooms, and social network websites
	03.04 Describe cyberbullying, its impact on perpetrators and victims and ways to respond.
	03.05 Describe risks associated with sexting (including legal issues, social consequences), and discuss methods for response, reporting, and prevention.
	03.06 Describe risks associated with online gaming, and identify ways to reduce these risks.
	03.07 Discuss issues related to downloading music or videos from the Internet, including unethical vs. illegal actions.
	03.08 Compare and contrast rules for copyright and fair use, especially in relation to using online resources for school and educational purposes.
	03.09 Distinguish between viruses and malware and discuss their impact on personal privacy and computer operation.
	03.10 Describe common threats used to spread malware and viruses, including phishing, pharming, Trojans, spyware, malicious sites, “free” downloads.
	03.11 Perform an antivirus scan on a computer system to check for viruses and malware.
	03.12 Describe strong password practices.
	03.13 Practice cyber safety techniques to protect your computer system when using Internet searches, email and social network websites.
	03.14 Identify security issues related to mobile phones, including personal information compromised if a phone is lost or stolen.
	03.15 Adhere to Acceptable Use Policies when accessing the Internet.
04.0	Demonstrate proficiency using the Internet to locate information. – The student will be able to:
	04.01 Identify and use web terminology (WWW, Web Browser, Internet, Web Server, Web Page, Address Bar, Hyperlinks, Navigation Buttons, Search Bar, Bookmarks/Favorites, Tab, Downloading, Plug-ins, Social Media Plug-ins).
	04.02 Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).
	04.03 Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).
	04.04 Demonstrate proficiency using search engines, including Boolean search techniques.

	04.05	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).
	04.06	Compare and contrast the roles of web servers and web browsers.
	04.07	Evaluate online information for relevance, credibility and quality using basic guidelines and indicators (e.g. authority, affiliation, purpose, bias, date).
	04.08	Identify and apply copyright and fair use guidelines, and explain plagiarism as an ethical and legal violation.
	04.09	Incorporate results from Internet searches into a research project (e.g., report, summary).
	04.10	Download images as needed to support a research project, complying with copyright notices.
	04.11	Properly cite Internet sources used to obtain information for a research project.
05.0	05.0	Demonstrate proficiency in using word processing software. – The student will be able to:
	05.01	Describe the general functions of word-processing software, including benefits for document creation, commonly used word-processing applications.
	05.02	Define the term “cloud computing,” and explain benefits of creating and storing word-processing documents online.
	05.03	List and describe common word-processor interface tools and features.
	05.04	Identify common keyboard shortcuts used in word processors, and explain the benefits of using shortcuts.
	05.05	Format the page setup of a document, including margins, line spacing, indents, headers vs. footers, orientation.
	05.06	Explain printing options in a word processor, including shrink-to-fit, 2-sided printing, and document orientation.
	05.07	Copy, paste and move text within a document using mouse, menu and keyboard techniques
	05.08	Copy, paste and move text among multiple documents using mouse, menu and keyboard techniques.
	05.09	Modify document view settings to display close-up, single and multiple pages.
	05.10	Define the term “format” as it relates to word processing.
	05.11	Format text using styles and font tools in a word processor.
	05.12	Format a document using multi-level heading styles to enable an outline view (e.g. document map, navigation pane) in a word processor.
	05.13	Create a table of contents using auto-generation tools and techniques in a word processor.
	05.14	Insert page breaks in a document.

05.15	Create source citations and/or a bibliography in a document.
05.16	Insert a current date and time stamp into a document.
05.17	Use word processor tools to determine the number of pages, words and characters in a document.
05.18	Use spell check, grammar check, thesaurus, and find & replace to edit a document.
05.19	Insert and modify sizing of images in a word-processing document.
05.20	Position an image relative to text in a document, using various text-wrapping options (inline, square, tight).
05.21	Use word-processing drawing tools to create pre-formatted shapes that enhance a document's content.
05.22	Use word-processor drawing tools to create a visual representation of information (e.g. SmartArt), such as diagram, flow chart.
05.23	Apply a column layout to text in a document as appropriate for the content (e.g., article, newsletter).
05.24	Apply simple numbered and bulleted lists in a document to make content easier to read and understand.
05.25	Format numbered and bulleted lists to produce multi-level outline in a document.
05.26	Create a simple brochure and/or flyer using a template.
05.27	Create a table in a word-processing document, and enter and move data in the table.
05.28	Convert a body of text into a table structure in a document to make content easier to read and understand.
05.29	Define "collaboration" and explain ways that users can collaborate on word-processing documents, including installed software vs. cloud-based software, real-time collaboration, auto save, sharing tools, revision history.
05.30	Use the translation tool in a word processor to translate text in a document from English into another language, and vice versa.
05.31	Add comments to a document when reviewing and/or editing content.
05.32	Revise a document using editing tools (e.g. Track Changes) in a word processor, and accept or reject changes as appropriate.
06.0	Demonstrate proficiency in using presentation software. – The student will be able to:
06.01	Describe presentation software and the ways it can be used.
06.02	Create and/or modify a "slide master" or template to apply a consistent appearance to a presentation.
06.03	Add and format titles, subtitles and talking points in presentation slides.
06.04	Add slide numbers and/or date and time codes to presentation slides.

06.05	Insert and format images/graphics in presentation slides.
06.06	Insert new or duplicate slides in a presentation.
06.07	Modify slide transitions in a presentation to include animation.
06.08	Insert and/or modify sound settings and timing in a presentation.
06.09	Modify the sequence of slides in a presentation.
06.10	Produce a presentation that includes text, graphics and images, and present it.
06.11	Modify a presentation's setup to repeat (i.e., loop) the presentation continuously.
07.0	Demonstrate proficiency in using graphics software. – The student will be able to:
07.01	Describe graphics software and the ways it can be used.
07.02	Compare and contrast vector and raster images.
07.03	Identify image file formats for photos and graphical art (e.g., TIFF, BMP, PSD, EPS, JPEG, GIF, PNG), and specify which formats are supported on the Web.
07.04	Define terms related to the creation and display of graphical images (e.g., raster, vector, transparency, opacity, cropping, lasso, magic wand, marquee, canvas size, flattened, blur, dodge, sharpen, staking order, free transform, lossless, adjustments, move, clone, zoom, layers, filter, distort).
07.05	Create images with effects using different tools, brushes, adjustments and filters available in graphics software.
07.06	Copy and paste graphical images.
07.07	Modify shapes and colors in a graphical image.
07.08	Save and export a digital photograph in a format that provides the best image quality and file size for Internet use.
07.09	Create a progressive slide presentation using graphical design/layout template features (e.g., SmartArt) and animated transitions.
07.10	Use a portable digital video device (e.g., mobile phone, flip camera) or similar online tools to shoot video files, and transfer them to a computer.
07.11	Use video-editing software to produce a slide show or movie.
07.12	Create a multimedia presentation that incorporates edited video, animation, music and/or narration, and that applies principles of good design, smooth transitions and effective message delivery.
08.0	Demonstrate appropriate use of email. – The student will be able to:
08.01	Define "email "and describe the functions and advantages as a form of communication.

08.02	Identify components of an email message.
08.03	Explain the format of an email address (i.e., user name, @ symbol, domain).
08.04	Attach a file to an email message.
08.05	Reply to and forward an email message to one or more addressees.
08.06	Use the Internet to perform email activities (i.e., web-based email).
08.07	Identify the appropriate use of email and demonstrate related email etiquette.
08.08	Perform email organization and cleanup (e.g., trash, flags, create folders).

Florida Department of Education
Student Performance Standards

Course Title: **Information & Communications Technology (ICT) Essentials 2**
Course Number: **9009120**
Course Length: **Year**
Grade: **6-8**

Course Description:

This course builds on the previous course and provides greater depth and more complex concepts and the skills/knowledge to master these concepts. Students will be provided opportunities to extend their skills with various software applications by creating more complex documents and using more complex functions. Students will also be exposed to structured programming and the creation of a more complex computer program. For the programming instruction, the use of Alice from Carnegie Mellon University is encouraged as it is a highly engaging program, includes instructional materials, and is available at no cost.

CTE Standards and Benchmarks	
09.0	Demonstrate knowledge of safety and privacy practices for online communication. The student will be able to:
09.01	Define “privacy” and relate it to the term “digital footprint.”
09.02	Describe the risks of communicating on social networking sites (e.g. Facebook, Twitter, Instagram) and identify ways to communicate safely.
09.03	Distinguish between copyright infringement, plagiarism and fair use in an educational setting and in relation to school projects, especially with music and pictures.
09.04	Describe online communication practices that contribute to cyberbullying.
09.05	Practice safe online communication techniques with Internet searches, email, chat rooms, and other social network Web sites.
09.06	Follow an Acceptable Use Policy (AUP) when accessing the Internet.
10.0	Develop and apply fundamental spreadsheet skills. – The student will be able to:
10.01	Define “spreadsheet” and describe ways it may be used.
10.02	Identify the parts of the spreadsheet display, including cells, columns and rows, cell references, cell range.
10.03	Create and navigate through multiple spreadsheets in a file.

CTE Standards and Benchmarks	
10.04	Insert and format various types of data (text, numeric, date/time) in a spreadsheet cells.
10.05	Select multiple cells, including adjacent and non-adjacent ranges, using mouse and keyboard techniques.
10.06	Cut, copy, and paste information from one or more cells to another part of the spreadsheet.
10.07	Use the undo and redo tools in a spreadsheet.
10.08	Apply and modify cell formatting for currency, date and percentage values.
10.09	Resize column width and row height in a spreadsheet.
10.10	Insert and delete columns and rows in a spreadsheet.
10.11	Merge and unmerge cells in a spreadsheet.
10.12	Apply shading and borders to a spreadsheet.
10.13	Describe the purpose of a table and how it relates to a spreadsheet.
10.14	Create and print a table and/or range that displays and sums the values of different data types.
10.15	Identify various types of charts (e.g., line, bar, pie, scatter) and common chart components (e.g., vertical axis, horizontal axis, legend), and explain when to use each chart type.
10.16	Create a chart from existing data and format the pieces (data set), change the background color, and add appropriate titles and a legend.
10.17	Use the auto sum function to calculate the values of multiple cells.
10.18	Insert common functions (SUM, AVERAGE, COUNT, MAX, MIN) and simple mathematical formulas which include addition, subtraction, multiplication, or division) into a spreadsheet.
10.19	Distinguish between absolute and relative cell references in a spreadsheet.
10.20	Use the sort function to organize information numerically or alphabetically, including multiple levels of sorting.
10.21	Use the filter function to display spreadsheet data based on specific criteria.
10.22	Use conditional formatting to highlight text in a spreadsheet.
11.0	Develop and apply database skills. – The student will be able to:
11.01	Define database and describe real-world uses (e.g. search engines, schools, drivers licenses & car registrations, hospitals, retail, law enforcement).
11.02	Distinguish between databases and spreadsheets.

CTE Standards and Benchmarks
11.03 Identify advantages of using a database instead of alternatives (e.g., spreadsheets, electronic documents, paper).
11.04 Define “Big Data” and describe how it is used in advertising.
11.05 Identify the components of a database.
11.06 Distinguish between fields and records in a database.
11.07 Describe the basic data types and formats used in a database.
11.08 Distinguish between a table and a query.
11.09 Identify database keys, including primary and foreign.
11.10 Identify the relationships between tables in databases (i.e., one-to-one, one-to-many, many-to-many).
11.11 Distinguish between a query and a report.
11.12 Identify various report types.
11.13 Describe Structured Query Language (SQL) and discuss its use with databases.
11.14 Identify and compare various database applications, including Microsoft Access, MySQL, Oracle.
11.15 Create a database table that uses multiple data types.
11.16 Add, Edit, and Delete records from a database table.
11.17 Sort records in a database query or table.
11.18 Troubleshoot common database errors, including data type errors, query syntax errors.
11.19 Create a basic select query in one table.
11.20 Create an action query to manipulate data.
11.21 Create a query using primary and foreign keys.
11.22 Create a simple table join.
11.23 Import and export data from a database into a spreadsheet.
11.24 Create relevant reports from a database.

CTE Standards and Benchmarks	
12.0	Demonstrate skill in using video editing software and equipment. – The student will be able to:
12.01	Demonstrate ability to operate a video camera (e.g., Flip camera, cell phone).
12.02	Write storyboards to depict a one minute video segment.
12.03	Determine appropriate lighting needs.
12.04	Create video shots sufficient to produce a one minute video.
12.05	Identify the functions and benefits of the digital video software interface.
12.06	Demonstrate ability to edit, cut, erase, and insert video.
12.07	Edit video as needed to achieve desired message and length.
12.08	Describe a first complete run-through of the video production process.
12.09	Characterize the qualities of effective communication in a completed video.
12.10	Upload finished video files to a website.
13.0	13.0 Demonstrate proficiency in using audio editing software (e.g., Audacity). – The student will be able to:
13.01	Identify the functions and benefits of the audio editing software interface.
13.02	Demonstrate ability to edit, cut, erase, and insert audio.
13.03	Edit audio as needed to achieve desired message and length.
13.04	Prepare a 30 second to 1 minute audio commercial project.
14.0	Demonstrate proficiency locating, gathering, and preparing textual, graphical, and image-based web content. – The student will be able to:
14.01	Define the elements of a webpage and what makes a good webpage.
14.02	Describe effective text and image content for Web pages based on how visitors use the Web.
14.03	List guidelines and conventions for effective text on Web page.
14.04	Explain the inverted pyramid model of newspaper journalism and how it applies to Web content.
14.05	Use word-processing software to create effective written content for a Web page.

CTE Standards and Benchmarks	
14.06	Create and/or edit message-driven image content for a Web page using graphics software.
14.07	Access graphics through various recourses (e.g., scanner, digital camera, CD-ROM, clipart, copyright-free online graphics).
14.08	Plan the content and design of a basic Web page using strategies for effective Web communication, including brainstorming, determining audience, choosing content and media types, using white space.

Florida Department of Education
Student Performance Standards

Course Title: **Information & Communications Technology (ICT) Essentials Careers and Career Planning**
Course Number: **9009140**
Course Length: **Year**
Grade: **6-8**

Course Description:

This course builds on the previous two courses and provides greater depth and more complex concepts and the skills/knowledge to master these concepts. In addition to working with network concepts, students will be provided opportunities to further extend their skills with various software applications by creating more complex documents and using more complex functions and technologies. Students will continue their exposure to computer programming and the creation of more complex computer programs. For the programming instruction, the use of Alice from Carnegie Mellon University is encouraged as it is a highly engaging program, includes instructional materials, and is available at no cost.

CTE Standards and Benchmarks	
15.0	Use Web 2.0 or Internet-based collaborative technology (e.g., Wikis, Wimba, Moodle, Edmodo, Facebook, Schoology, Gaggle) to facilitate a web development or research project. – The student will be able to:
15.01	Create and use a collaborative environment for communicating and sharing among project team members.
15.02	Create and use a social media page (e.g., Wikis, Wimba, Moodle, Edmodo, Facebook, Schoology, Gaggle) to share and publish project components (e.g., content, images, graphics, videos) for gauging visitor reaction and obtaining feedback.
16.0	Demonstrate an understanding of computer networks. – The student will be able to:
16.01	Define “network” and give examples of networks used at home, school, and work.
16.02	Compare types of networks, including LAN, WAN, MAN, VPN, intranet, extranet, the Internet.
16.03	Compare common network topologies, including bus, star, ring, mesh.
16.04	Compare various network models and their advantages, including client/server, mainframe/terminal, peer-to-peer.
16.05	Compare various methods and media for network connections, including broadband, wireless, Bluetooth, cellular, satellite.
16.06	Describe the functions of various network hardware devices, including NIC, hub, switch, router, bridge, gateway, access point.
16.07	Describe the purpose of protocols, and identify the protocols commonly used in networks, including TCP/IP, DHCP, DNS, HTTP, FTP, IMAP, POP, SMTP.

CTE Standards and Benchmarks	
16.08	Describe the purpose and function of IP addressing and distinguish between public and private IP addresses.
16.09	Describe the OSI reference model and its layers, including tracing the flow of data between two network nodes through the OSI layers.
17.0	Demonstrate proficiency in web page development. – The student will be able to:
17.01	Identify website domains, and relate a site's domain to its purpose.
17.02	Relate basic components of a webpage (e.g. color, space, written content, typography, images, links, multimedia) to aesthetic, functional and/or usable design principals.
17.03	Define aesthetic design, and explain how aesthetics can affect a visitors' perception of a website's information.
17.04	Demonstrate knowledge of color wheel concepts and effective use of color on a website.
17.05	Compare functional and usable design principles, and explain how usability can affect a website's success.
17.06	Critique the aesthetic design, usability and accessibility of sample websites.
17.07	Define multimedia, and identify its role in webpage interactivity.
17.08	Explain the primary steps of the website planning process.
17.09	Apply the website planning process to plan the design for basic website.
17.10	Build the site navigation scheme for a website.
17.11	Compare webpage creation using an HTML text editor to using a graphical user interface (GUI) editor.
17.12	Compare website creation using an online site builder, an offline site builder and a content management system (CMS).
17.13	Modify an existing webpage template to create an effective look and feel for a website.
17.14	Create a website using a template.
17.15	Define "HTML (Hypertext Markup Language)" and related terms, including tag vs. element, container vs. empty tag, block-level vs. inline element, attribute value, semantic tag.
17.16	Identify HTML elements required to create webpage structure.
17.17	Create webpages using basic HTML tags (e.g., headings, lists, character styles, text alignment, tables, comments).
17.18	Use HTML to create hyperlinks to external sites.

CTE Standards and Benchmarks
17.19 Use HTML to insert common image file formats into webpages, and use an image as a hyperlink.
17.20 Explain Cascading Style Sheet (CSS) technology.
17.21 Apply CSS styles to an HTML page.
17.22 Create and/or edit animation files, and integrate them into a webpage.
17.23 Create and/or edit video files, and integrate them into a webpage.
17.24 Use Dynamic HTML (DHTML) to enhance webpage interactivity.
17.25 Create and use a wiki or similar tool for collaborating among project team members.
17.26 Create and use a social media page (e.g., Facebook, Wimba, Edmodo) and/or a blog to share content and collaborate on projects.
17.27 Review webpage content, verify copyright restrictions, and create meta-data before publishing a site to the internet.
17.28 Test webpages for display, functionality, and accessibility before publishing a site to the Internet.
17.29 Validate webpage code using W3C validation tools before publishing a site to the Internet.
17.30 Describe network issues relating to websites, including bandwidth, compression, streaming, web hosting.
17.31 Explain the purpose of File Transfer Protocol (FTP) in accessing information on the Internet.
17.32 Publish a website using FTP.
17.33 Describe website security methods, including secure server vs. unsecured served, SSL, SSH, encryption.
18.0 Demonstrate proficiency in game development. – The student will be able to:
18.01 Describe the role of games in modern society (e.g., education, task training, social networking, therapy, recreation).
18.02 Identify various types of games (e.g., chance, skill, knowledge, role-playing, and storytelling).
18.03 Identify the steps of the design process for creating a game.
18.04 Apply the design process to solving a problem.
18.05 Analyze (deconstruct) existing games.
18.06 Identify the tools and skills needed for creating games.

CTE Standards and Benchmarks
18.07 Identify design criteria and constraints.
18.08 Create storyboards to model a game's program flow and functionality.
18.09 Identify the programmer's role in creating games.
18.10 Identify common programming languages and applications used to create computer games.
18.11 Compare sequential, iteration (loop) and selection programming structures.
18.12 Define the term algorithm (i.e., a set of repeatable steps) and how it applies to problem solving.
18.13 Create an algorithm to solve a problem or complete a task.
18.14 Use pseudo-code to model a game program's flow.
18.15 Define logic errors and identify them in a game program or model.
18.16 Explain the types and uses of variables in game programming.
18.17 Describe basic Boolean concepts, including logical operators, order of precedence, expressions.
18.18 Describe the use of events, event handlers and functions in game programming.
18.19 Describe the use of parameters and arguments in game programming.
18.20 Describe the use of objects, classes and instances in game programming.
18.21 Describe the use of properties and methods with objects in game programming.
18.22 Write appropriate code to create a simple game using structured programming.
18.23 Test and evaluate the game program you created.
18.24 Modify the game program as needed to solve a problem.
18.25 Create an animated object (i.e., sprite) to be used in a game program.
18.26 Use programming code to control the behavior of an animated object (i.e., sprite) in a game program.
19.0 Demonstrate proficiency in basic programming. – The student will be able to:
19.01 Define "programming" and discuss its role in computing.
19.02 Explain the binary representation of data and programs in computers.

CTE Standards and Benchmarks	
19.03	Distinguish among the three types of programming languages (machine, assembly, high-level), and give examples.
19.04	Compare and contrast languages that are usually compiled (e.g., C++, Java) and interpreted (e.g., JavaScript, Python).
19.05	Describe the structure of a simple program, and explain why sequencing is important.
19.06	Write a program design document using pseudo-code that shows program flow.
19.07	Explain strategies used in problem-solving, and relate them to computer programming.
19.08	Define the term “algorithm,” and explain how it relates to problem-solving.
19.09	Explain the three types of programming errors (i.e., logic, syntax, runtime), and describe the forms of testing that can be used to locate and debug errors.
19.10	Solve a problem using logic by planning a strategy, designing and testing a hypothesis, and/or creating a set of step-by-step instructions to perform a task.
19.11	Define “structured programming” and discuss the advantages of this approach.
19.12	Define the three main programming control structures used in structured programming: sequential, selection (decision), and iteration (loops).
19.13	Describe iterative programming structures (e.g., while, do/while) and how they are used in programming.
19.14	Describe selection programming structures (e.g., if/then, else) and explain the logic used for if statements.
19.15	Write a simple program in pseudo-code that uses structured programming to solve a problem.
19.16	Explain the types and uses of variables in programming.
19.17	Explain basic object-oriented concepts.
19.18	Describe fundamental Boolean concepts, including Boolean algebra, operators, logic.
19.19	Create animated objects using a high-level programming environment (e.g., Alice, Greenfoot) to control their behavior.
19.20	Create a simple program that uses animated objects.
19.21	Convert a simple program from pseudo-code into a common high-level programming environment (e.g. Alice, Greenfoot).
19.22	Troubleshoot and debug errors in code.

CTE Standards and Benchmarks	
<u>Listed below are the course outcomes that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes</u> – The student will be able to:	
20.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
21.0	Develop skills to locate, evaluate, and interpret career information.
22.0	Identify and demonstrate processes for making short and long term goals.
23.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
24.0	Understand the relationship between educational achievement and career choices/postsecondary options.
25.0	Identify a career cluster and related pathways that match career and education goals.
26.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
27.0	Demonstrate knowledge of technology and its application in career fields/clusters.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA) and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Course Title: **Fundamentals of Networking and Information Support**
Course Type: **Orientation/Exploratory**
Career Cluster: **Information Technology**

Secondary – Middle School	
Course Number	9009400
CIP Number	149009400M
Grade Level	6-8
Standard Length	Year
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G CYBER TECH 7G
CTSO	FBLA BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Information Technology career cluster. The content includes but is not limited to foundational knowledge and skills related to computer networks and information support structure in the information technology industry.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf.
For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Additional Information relevant to this Career and Technical Education (CTE) course is provided at the end of this document.

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Demonstrate comprehension and communication skills.
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate an understanding of Internet safety and ethics.
05.0 Perform e-mail activities.
06.0 Demonstrate knowledge of different operating systems.
07.0 Demonstrate proficiency navigating the Internet and the intranet.
08.0 Develop an awareness of microprocessors and digital computers.
09.0 Demonstrate an understanding of the Open Systems Interface (OSI) model.
10.0 Identify computer components and their functions.
11.0 Demonstrate proficiency using computer networks.
12.0 Demonstrate an understanding of database design, structure, and operation.
13.0 Demonstrate a fundamental understanding of Structured Query Language (SQL).

Florida Department of Education
Student Performance Standards

Course Title: **Fundamentals of Networking and Information Support**
Course Number: **9009400**
Course Length: **Year**

Course Description:

This course provides students with opportunities to acquire foundational knowledge and skills suitable for pursuing higher level programs of study related to the information technology industry.

CTE Standards and Benchmarks	
01.0	Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance. – The student will be able to:
01.01	Develop keyboarding skills to enter and manipulate text and data.
01.02	Describe and use current and emerging computer technology and software to perform personal and business related tasks.
01.03	Identify and describe communications and networking systems used in workplace environments.
01.04	Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.
01.05	Describe ethical issues and problems associated with computers and information systems.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively.
02.02	Organize ideas and communicate oral and written messages appropriate for information technology environments.
02.03	Collaborate with individuals and teams to complete tasks and solve information technology problems.
02.04	Demonstrate an awareness of project management concepts and tools (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration).
03.0	Use technology to enhance the effectiveness of communication skills. – The student will be able to:
03.01	Use database, spreadsheet, presentation software, scheduling, and integrated software packages to enhance communication.
03.02	Respond to and utilize information derived from multiple sources (e.g., written documents, instructions, e-mail, voice mail) to solve problems and complete tasks.

CTE Standards and Benchmarks	
04.0	Demonstrate an understanding of Internet safety and ethics. – The student will be able to:
04.01	Describe cyber-bullying and its impact on perpetrators and victims.
04.02	Differentiate between viruses and malware, specifically their sources, ploys, and impact on personal privacy and computer operation, and ways to avoid infection.
04.03	Describe risks associated with sexting, including related legal issues, social engineering aspects, prevention methods, and reporting of offenses.
04.04	Describe the risks associated with online gaming and ways to mitigate these risks.
04.05	Describe the ethics and copyright legalities of downloading music or videos from the Internet.
04.06	Describe risks associated with social networking sites (e.g., FaceBook, MySpace, Twitter) and ways to mitigate these risks.
04.07	Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.
05.0	Perform email activities. – The student will be able to:
05.01	Describe email capabilities and functions.
05.02	Identify components of an email message.
05.03	Identify the components of an email address.
05.04	Identify when to use different email options.
05.05	Attach a file to an email message.
05.06	Forward an email message.
05.07	Use an address book.
05.08	Reply to an email message.
05.09	Use the Internet to perform email activities.
05.10	Identify the appropriate use of email and demonstrate related email etiquette.
05.11	Identify when to include information from an original email message in a response.
05.12	Identify common problems associated with widespread use of email.
06.0	Demonstrate knowledge of different operating systems. – The student will be able to:
06.01	Identify operating system file naming conventions.
06.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).

CTE Standards and Benchmarks	
	06.03 Demonstrate a working knowledge of standard file formats.
	06.04 Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, Unix/Linux).
07.0	Demonstrate proficiency navigating the Internet and the intranet. – The student will be able to:
	07.01 Identify and describe Web terminology.
	07.02 Demonstrate proficiency in using the basic features of GUI browsers (e.g., setting bookmarks, basic configurations, email configurations, address book).
	07.03 Define Universal Resource Locators (URLs) and associated protocols (e.g., .com, .org, .edu, .gov, .net, .mil).
	07.04 Demonstrate proficiency using search engines (e.g., Yahoo!, Google).
	07.05 Demonstrate proficiency downloading files.
	07.06 Identify effective Boolean search strategies.
08.0	Develop an awareness of microprocessors and digital computers. – The student will be able to:
	08.01 Describe the evolution of the digital computer.
	08.02 Explain the general architecture of a microcomputer system.
	08.03 Explain the evolution of microprocessors.
	08.04 Explain software hierarchy and its impact on microprocessors.
	08.05 Explain the need for and use of peripherals.
	08.06 Demonstrate proficiency using peripherals.
	08.07 Identify the basic concepts of computer maintenance and upgrades.
	08.08 Differentiate between diagnosing and troubleshooting.
09.0	Demonstrate an understanding of the Open Systems Interface (OSI) model. – The student will be able to:
	09.01 Describe the evolution of OSI from its inception to the present and into the future.
	09.02 Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.
	09.03 Describe the purpose of the OSI model and each of its layers.
	09.04 Explain specific functions belonging to each OSI model layer.

CTE Standards and Benchmarks	
	09.05 Understand how two network nodes communicate through the OSI model.
	09.06 Discuss the structure and purpose of data packets and frames.
	09.07 Describe the two types of addressing covered by the OSI model.
10.0	Identify computer components and their functions. – The student will be able to:
	10.01 Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).
	10.02 Use common computer and programming terminology.
11.0	Demonstrate proficiency using computer networks. – The student will be able to:
	11.01 Define networking and describe the purpose of a network.
	11.02 Describe the conceptual background of digital networks including terminology and basics.
	11.03 Describe various types of networks and the advantages and disadvantages of each (e.g. peer to peer, client/server, mainframe/terminal).
	11.04 Describe the use, advantages, and disadvantages of various network media (e.g. thinnet cable, coaxial), twisted pair (cat 5), fiber optics).
	11.05 Describe the function of various network devices (e.g. hub, switched hub or switch, router bridge, gateway, access points).
	11.06 Describe how network devices are identified (i.e., IP addressing).
	11.07 Explain the protocols commonly used in a network environment.
	11.08 Differentiate between public and private IP addresses.
	11.09 Describe the common ports and corresponding protocols used in a network.
	11.10 Describe the difference between the Internet and intranet.
	11.11 Discuss the differences between Local Area Network (LAN), Wide Area Network (WAN), Metropolitan Area Network (MAN), and Virtual Private Network (VPN).
12.0	Demonstrate an understanding of database design, structure, and operation. – The student will be able to:
	12.01 Describe a relational database and its key elements.
	12.02 Describe the Entity Relationship Model (ERM).

CTE Standards and Benchmarks	
12.03	Differentiate between one-to-many, many-to-many and one-to-one relationships.
12.04	Define referential integrity and describe its importance to managing information.
13.0	Demonstrate a fundamental understanding of Structured Query Language (SQL). – The student will be able to:
13.01	List the capabilities of SQL SELECT statements.
13.02	Execute basic SQL statements, including SELECT, INSERT, and UPDATE.
13.03	Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.
13.04	Use the AS clause to define column aliases to rename columns in the query result.
13.05	Use SQL to display the structure of a table.
13.06	Apply SQL syntax to restrict the rows returned from a query.
13.07	Demonstrate application of the WHERE clause syntax.
13.08	Apply the proper comparison operator to return a desired result.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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Additional Resources

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Florida Department of Education
Curriculum Framework

Course Title: **Fundamentals of Web and Software Development**
Course Type: **Orientation/Exploratory**
Career Cluster: **Information Technology**

Secondary – Middle School	
Course Number	9009500
CIP Number	149009500M
Grade Level	6-8
Standard Length	Year
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G WEB DEV 7G COMP PROG 7G
CTSO	FBLA BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Information Technology career cluster. The content includes but is not limited to foundational knowledge and skills related to web and software development in the information technology industry.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:
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Additional Information relevant to this Career and Technical Education (CTE) course is provided at the end of this document.

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Demonstrate comprehension and communication skills.
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate an understanding of Internet safety and ethics.
05.0 Perform e-mail activities.
06.0 Demonstrate knowledge of different operating systems.
07.0 Demonstrate proficiency navigating the Internet and the intranet.
08.0 Demonstrate proficiency using HTML commands.
09.0 Demonstrate proficiency in webpage design.
10.0 Demonstrate proficiency using specialized web design software.
11.0 Develop an awareness of programming languages.
12.0 Demonstrate proficiency using common software applications.

Florida Department of Education
Student Performance Standards

Course Title: **Fundamentals of Web and Software Development**
Course Number: **9009500**
Course Length: **Year**

Course Description:

This course provides students with opportunities to acquire foundational knowledge and skills suitable for pursuing higher level programs of study related to the information technology industry.

CTE Standards and Benchmarks	
01.0	Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance. – The student will be able to:
01.01	Develop keyboarding skills to enter and manipulate text and data.
01.02	Describe and use current and emerging computer technology and software to perform personal and business related tasks.
01.03	Identify and describe communications and networking systems used in workplace environments.
01.04	Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.
01.05	Describe ethical issues and problems associated with computers and information systems.
02.0	Demonstrate comprehension and communication. – The student will be able to:
02.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively.
02.02	Organize ideas and communicate oral and written messages appropriate for information technology environments.
02.03	Collaborate with individuals and teams to complete tasks and solve information technology problems.
02.04	Demonstrate an awareness of project management concepts and tools (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration).
03.0	Use technology to enhance the effectiveness of communication skills. – The student will be able to:
03.01	Use database, spreadsheet, presentation software, scheduling, and integrated software packages to enhance communication.
03.02	Respond to and utilize information derived from multiple sources (e.g., written documents, instructions, email, voice mail) to solve problems and complete tasks.

CTE Standards and Benchmarks	
04.0	Demonstrate an understanding of Internet safety and ethics. – The student will be able to:
04.01	Describe cyber-bullying and its impact on perpetrators and victims.
04.02	Differentiate between viruses and malware, specifically their sources, ploys, and impact on personal privacy and computer operation, and ways to avoid infection.
04.03	Describe risks associated with sexting, including related legal issues, social engineering aspects, prevention methods, and reporting of offenses.
04.04	Describe the risks associated with online gaming and ways to mitigate these risks.
04.05	Describe the ethics and copyright legalities of downloading music or videos from the Internet.
04.06	Describe risks associated with social networking sites (e.g., FaceBook, MySpace, Twitter) and ways to mitigate these risks.
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05.01	Describe email capabilities and functions.
05.02	Identify components of an email message.
05.03	Identify the components of an email address.
05.04	Identify when to use different email options.
05.05	Attach a file to an email message.
05.06	Forward an email message.
05.07	Use an address book.
05.08	Reply to an email message.
05.09	Use the Internet to perform email activities.
05.10	Identify the appropriate use of email and demonstrate related email etiquette.
05.11	Identify when to include information from an original email message in a response.
05.12	Identify common problems associated with widespread use of email.
06.0	Demonstrate knowledge of different operating systems. – The student will be able to:
06.01	Identify operating system file naming conventions.
06.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).

CTE Standards and Benchmarks	
	06.03 Demonstrate a working knowledge of standard file formats.
	06.04 Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, Linux).
07.0	Demonstrate proficiency navigating the Internet and the intranet. – The student will be able to:
	07.01 Identify and describe Web terminology.
	07.02 Demonstrate proficiency in using the basic features of GUI browsers (e.g., setting bookmarks, basic configurations, email configurations, address book).
	07.03 Define Universal Resource Locators (URLs) and associated protocols (e.g., .com, .org, .edu, .gov, .net, .mil).
	07.04 Demonstrate proficiency using search engines (e.g., Yahoo!, Google).
	07.05 Demonstrate proficiency downloading files.
	07.06 Identify effective Boolean search strategies.
08.0	Demonstrate proficiency using HTML commands. – The student will be able to:
	08.01 Identify elements of a Web page.
	08.02 Define basic HTML terminology.
	08.03 Analyze HTML source code developed by others.
	08.04 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
	08.05 Edit and test HTML documents for accuracy and validity.
	08.06 Create a website using basic functions of a WYSIWYG or GUI editor.
	08.07 Use basic functions of HTML, DHTML, and XML editors and converters.
	08.08 Enhance web pages through the addition of images and graphics including animation.
09.0	Demonstrate proficiency in webpage design. – The student will be able to:
	09.01 Demonstrate an understanding of acceptable webpage design.
	09.02 Design a website using storyboarding techniques.
	09.03 Describe and apply color theory as it applies to webpage design (e.g., background and text color).
	09.04 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).

CTE Standards and Benchmarks	
	09.05 Use image design software to create and edit images.
	09.06 Demonstrate proficiency in publishing to the Internet.
10.0	Demonstrate proficiency using specialized web design software. – The student will be able to:
	10.01 Compare and contrast various specialized web design software (e.g., Dreamweaver, Flash).
	10.02 Demonstrate proficiency using various specialized web design software (e.g., Dreamweaver, Flash).
11.0	Develop an awareness of programming languages. – The student will be able to:
	11.01 Explain the history of programming languages.
	11.02 Explain the need for and use of compilers.
	11.03 Explain how compilers work.
	11.04 Identify the three types of programming design approaches (e.g., top-down, structured, object-oriented).
	11.05 Compare the various types or classes of programming languages (e.g., compiled, interpretive).
	11.06 Differentiate among source code, machine code, interpreters, and compilers.
	11.07 Characterize the major categories of programming languages and how they are used.
	11.08 Create a model flowchart for a computer program.
	11.09 Describe the stages in the software development life cycle.
12.0	Demonstrate proficiency using common software applications. – The student will be able to:
	12.01 Compare and contrast the appropriate use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database).
	12.02 Demonstrate proficiency in the use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database).

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Additional Resources

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Florida Department of Education
Curriculum Framework

Program Title: **Advanced Network Virtualization**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100117
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 34 credit hours; Secondary: 27 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of computer network maintenance and support.
02.0 Demonstrate an understanding of operating systems.
03.0 Demonstrate the fundamentals of computer virtualization.
04.0 Install and configure the virtualization server platform.
05.0 Install, configure and manage virtualized clients.
06.0 Install, configure, test, and monitor virtualized applications.
07.0 Manage, configure and maintain a virtualization infrastructure.

Florida Department of Education
Student Performance Standards

Program Title: **Advanced Network Virtualization**
CIP Number: **0511100117**
Program Length: **Primary: 34 credit hours; Secondary: 27 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic computer network maintenance and support. – The student will be able to:
01.01	Describe the main computer components and their functions.
01.02	Describe the operation of computer systems, including input and output systems, file systems, device management, program loading and execution and data storage.
01.03	Demonstrate the safe and ethical use of computers.
01.04	Demonstrate proficiency in connecting to and safely using the Internet.
01.05	Describe emerging computer technologies and discuss their potential impact.
01.06	Implement proper procedures for handling and safeguarding equipment.
01.07	Describe procedures for proper disposal of computer components.
01.08	Install, configure, maintain and secure computer systems and peripherals following institutional protocol.
01.09	Configure and update firmware and ROM-BIOS.
01.10	Implement work order procedures.
01.11	Design and implement systems redundancy and data backups.
01.12	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
01.13	List the steps in problem solving.
01.14	Recognize and resolve basic computer configuration problems.
02.0	Demonstrate an understanding of common operating system concepts and associated practices. – The student will be able to:
02.01	Describe the components and functions of major operating systems.
02.02	Compare and contrast major functions and features of current network operating systems (including directory services).
02.03	Install, configure and update client and server operating systems.

02.04	Describe the purpose and uses of computer virtualization.
02.05	Manage device drivers and software for peripheral devices.
02.06	Manage the network and firewall settings of a client.
02.07	Use an operating system for activities such as data and file management.
02.08	Identify current systems utilities and describe their functions.
02.09	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
02.10	Create, use, maintain, backup and restore system configuration files.
02.11	Describe procedures for uninstalling operating system software.
02.12	Install and configure client software for connecting to LANs, WANs, and the Internet.
02.13	Demonstrate knowledge of basic troubleshooting methodology.
03.0	Demonstrate an understanding of virtualization concepts. – The student will be able to:
03.01	Describe the purpose and uses of computer virtualization.
03.02	Identify and describe virtualization products, applications and services.
03.03	Identify compatibility issues among hardware and software products.
03.04	Describe the key features of virtualization software.
03.05	Identify the elements necessary for a Virtual Desktop Infrastructure.
03.06	Explain the benefits and considerations for virtual storage, including local host disk, iSCSI SAN, Fibre Channel SAN, and NFS SAN.
03.07	Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
03.08	Describe backup, recovery, disaster recovery, business continuity, and replication concepts.
03.09	Describe the policies and profile management which restrict and allow features.
03.10	Identify and modify desktop catalogs, groups, and a master virtual machine.
04.0	Install and configure the virtualization server platform. – The student will be able to:
04.01	Install and configure the virtualization platform using Windows and Linux-based applications.
04.02	Install and configure the virtualization environment to create a new farm or join an existing farm.
04.03	Automate virtual machine and cluster deployment.

04.04	Monitor and maintain license usage requirements and trends.
04.05	Manage virtualization networking and storage.
04.06	Manage user sessions from the administrative console.
04.07	Configure network connectivity and storage for the virtualization software.
05.0	Install, configure and manage virtualized clients. – The student will be able to:
05.01	Identify requirements for virtual machines according to task.
05.02	Configure the virtual environment and the virtual machine properties.
05.03	Install, configure and manage a virtual machine desktop client.
05.04	Install, configure and manage a virtualized server.
05.05	Manually deploy and migrate virtual machines.
05.06	Configure and assign users to pooled virtual desktops and dedicated virtual desktops.
05.07	Convert physical machines to virtual machines.
05.08	Configure desktop resources for access by users.
05.09	Configure and monitor back up virtual machine data to shared storage.
05.10	Migrate, convert, and monitor virtual machines.
05.11	Create and update shared disks.
05.12	Optimize the end user experience.
06.0	Install, configure, and maintain a virtualized application. – The student will be able to:
06.01	Install and configure a virtualized application.
06.02	Configure virtualization applications to use a proxy.
06.03	Configure virtualized application resources for access by users.
06.04	Install and use profiling software on a virtualized application for streaming, and linking dependent profiles to allow interaction between streamed applications.
06.05	Monitor virtualization applications and implementing policies.
06.06	Migrate, convert, and monitor virtual appliances.

06.07	Test policies to verify the achievement of the desired effect.
06.08	Configure and deliver a plug-in package, and verifying that self-service applications can be added from a client device.
06.09	Install and configure provisioning services.
06.10	Optimize a provisioning services server.
06.11	Optimize the end user experience.
07.0	Demonstrate proficiency in managing a virtualization infrastructure. – The student will be able to:
07.01	Manage user access to virtualized applications and machines in the virtualization infrastructure.
07.02	Manage the infrastructure to provide high availability and data access.
07.03	Administer the virtualization environment using Windows or Linux software.
07.04	Describe tools that can be used to monitor virtualization application servers and sessions.
07.05	Manage and maintain network infrastructure and storage resources.
07.06	Create and apply worker groups.
07.07	Configure and optimize load management.
07.08	Configure print services, including printer auto-creation, driver compatibility lists, and session printers, and printing policies.
07.09	Configure a resource pool for optimal performance.
07.10	Troubleshoot infrastructure problems and virtual environment issues.
07.11	Resolve application compatibility issues.
07.12	Optimize the end user experience.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Security**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100118
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 30 credit hours; Secondary: 20 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency in network design, configuration and troubleshooting.
02.0 Demonstrate proficiency in securing network infrastructures and protecting data.
03.0 Demonstrate proficiency in performing security penetration testing.
04.0 Demonstrate proficiency in responding to cybersecurity incidents.
05.0 Demonstrate proficiency in the essential elements of forensic analysis.
06.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: **Network Security**
CIP Number: **0511100118**
Program Length: **Primary: 30 credit hours; Secondary: 20 credit hours**
SOC Code(s): **15-1122**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in network design, configuration and troubleshooting. – The student will be able to:
01.01	Perform various PC maintenance and repair operations.
01.02	Deploy and manage various operating systems including Windows, Linux and Apple IOS operating systems.
01.03	Explain the OSI model for LAN and WAN communications.
01.04	Describe LAN topologies and transport methods.
01.05	Explain WAN topologies and transport methods.
01.06	Build various kinds of network media.
01.07	Configure various network equipment, including NICs, servers, wireless access points, hubs, routers, switches, and gateways.
01.08	Describe the purpose of WAN network equipment, including multiplexers, channel banks, private networks, modems, access servers, and routers.
01.09	Implement various application protocols in the TCP/IP suite.
01.10	Troubleshoot various network problems at both the hardware and software levels.
02.0	Demonstrate proficiency in securing network infrastructures and protecting data. – The student will be able to:
02.01	Explain the major categories of computer crimes and attacks.
02.02	Identify the vulnerabilities inherent in each network device, protocol, and service.
02.03	Develop institutional security policies and practices in compliance with various governmental standards and regulations.
02.04	Implement protective measures in securing critical information assets.
02.05	Deploy various network security related equipment including, firewalls, intrusion prevention systems, and proxies.

02.06	Secure critical network services e.g. Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), and File Transfer Protocol (FTP).
02.07	Secure desktop client operating systems against viruses, malware and other malicious attacks.
02.08	Detect malicious and abnormal activities through logs, intrusion detection systems and other utilities and appliances.
03.0	Demonstrate proficiency in performing security penetration testing. – The student will be able to:
03.01	Assist an organization in evaluating their current security posture by identifying gaps in security.
03.02	Audit organizational compliance with regulatory and legislative Information Assurance (IA) requirements.
03.03	Identify logical weaknesses in computers and networks as well as physical weaknesses and weaknesses in policies, procedures and practices relating to the network and the organization.
03.04	Test the network perimeter defense mechanisms to ensure safe cyber boundaries.
03.05	Simulate methods that intruders use to gain unauthorized access to an organization's networked systems and then compromise them.
03.06	Deploy proprietary and/or open source tools to test known technical vulnerabilities in networked systems.
03.07	Determine which vulnerabilities are exploitable and the degree of information exposure or network control that the organization could expect an attacker to achieve after successfully exploiting vulnerability.
03.08	Recommend appropriate mitigation procedures against discovered vulnerabilities and security gaps.
03.09	Prepare penetration testing deliverables including reports, documentations.
03.10	Model the ethics of a licensed Penetration Tester.
04.0	Demonstrate proficiency in responding to cybersecurity incidents. – The student will be able to:
04.01	Explain contingency planning and its components.
04.02	Collect data from logs and other resources to aid in detecting security incidents.
04.03	Assemble an incidence response plan.
04.04	Recover from incidents by restoring services and processes.
04.05	Manage evidentiary data in an electronic environment.
05.0	Demonstrate proficiency in the essential elements of forensic analysis. – The student will be able to:
05.01	Describe the four phases of forensic analysis and discuss the activities performed in each phase.
05.02	Describe the forensic and evidentiary considerations when determining containment.
05.03	Describe the types and sources of data collected for forensic analysis.

	05.04 Explain the various forms of data and associated collection/retrieval tools for the application transport, IP, and link layers.
	05.05 Explain the processes by which data is collected for analysis.
	05.06 Describe the role of system event logs in data collection.
	05.07 Describe the role of the process log in data collection.
	05.08 Describe the processes associated with preserving evidence collected for forensic purposes.
	05.09 Describe how the chain of custody can be maintained for evidence collected during a forensic analysis effort.
06.0	Demonstrate employability skills. – The student will be able to:
	06.01 Conduct a job search.
	06.02 Secure information about a job.
	06.03 Identify documents that may be required when applying for a job.
	06.04 Complete a job application form correctly.
	06.05 Demonstrate competence in job interview techniques.
	06.06 Demonstrate knowledge of how to make appropriate decisions.
	06.07 Demonstrate appropriate work/behavioral habits.
	06.08 Demonstrate acceptable employee personal hygiene and health.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Digital Forensics**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100119
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 32 credit hours; Secondary: 24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency in basic and advanced security concepts.
02.0 Demonstrate proficiency in managing hardware involved in imaging and data collection activities.
03.0 Demonstrate proficiency in analyzing common file systems.
04.0 Demonstrate proficiency in performing computer forensics investigations.
05.0 Demonstrate proficiency in performing mobile device forensics.
06.0 Demonstrate proficiency in incident handling and response.
07.0 Identify key pieces of legislation and processes related to digital forensics.
08.0 Understand the tasks related to the casework process.

Florida Department of Education
Student Performance Standards

Program Title: **Digital Forensics**
CIP Number: **0511100119**
Program Length: **Primary: 32 credit hours; Secondary: 24 credit hours**
SOC Code(s): **15-1122**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic and advanced security concepts. – The student will be able to:
01.01	Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications.
01.02	Describe the basic categories of vulnerabilities associated with cybersecurity (i.e., hardware, software, network, human, physical, organizational).
01.03	Describe the role of certificates and their role in cybersecurity.
01.04	Describe network-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature).
01.05	Describe the use of firewalls and other means of intrusion prevention.
01.06	Describe security design principles and their role in limiting points of vulnerability.
01.07	Discuss authentication methods and strategies.
01.08	Describe the processes involved in hardening a computer system or network.
01.09	Compare and contrast the forms, limitations, and vulnerabilities associated with centralized and decentralized key management schemas, including the PKI web of trust model.
01.10	Evaluate an existing security posture and identify gaps and vulnerabilities in security.
01.11	Describe the types of penetration tests (i.e., human, physical, wireless, data networks, telecommunications), the goals of each type, the metrics tested, and the value of their results.
01.12	Compare and contrast the processes of black box versus white box penetration testing, including their characteristics, limitations, and appropriateness.
01.13	Describe common testing methodologies and standards used in penetration testing.
01.14	Describe the activities that make up the Preparation Phase of the Incident Response Life Cycle, including identification of useful tools and resources.
01.15	Describe the range of testing/evaluation and associated tools used to monitor mitigation control effectiveness.

01.16	Create a risk management framework.
01.17	Describe the purpose and scope of an Information Systems Contingency Plan (ISCP).
01.18	Identify the five main components of a contingency plan (i.e., Supporting Information, Activation and Notification, Recovery, Reconstitution, Appendices).
01.19	Describe the purpose and scope of a cybersecurity disaster recovery plan.
01.20	Describe the purpose and scope of a cybersecurity business continuity plan.
01.21	Describe the four phases of forensic analysis and discuss the activities performed in each phase.
01.22	Describe the forensic and evidentiary considerations when determining containment.
01.23	Describe the types and sources of data collected for forensic analysis.
01.24	Explain the various forms of data and associated collection/retrieval tools for the application transport, IP, and link layers.
01.25	Describe the essential elements of forensic analysis.
02.0	Demonstrate proficiency in managing hardware involved in imaging and data collection activities. – The student will be able to:
02.01	Motherboard Connections.
02.02	Motherboard components and functions.
02.03	Optical drives.
02.04	Hard drives.
02.05	IDE.
02.06	EIDE/PATA.
02.07	SCSI.
02.08	SATA.
02.09	Esata.
02.10	Solid State drives.
02.11	Other removable media.
02.12	RAID Connections and Issues.

02.13	Types of connectors and connections.
02.14	General personal computer processes.
02.15	Boot process.
02.16	Forensic/controlled boot process.
03.0	Demonstrate proficiency in analyzing common file systems. – The student will be able to:
03.01	Master Boot Record.
03.02	Boot Parameter Block (BPB) components.
03.03	Format Process: FAT 16 and FAT 32.
03.04	File creation and deletion processes and artifacts.
03.05	Pertinent operating system files including WIN386.SWP.
03.06	NTFS.
03.06.1	File creation and deletion processes and artifacts.
03.06.2	Pertinent operating system files including the MFT and Pagefile.
03.06.3	Registry.
03.06.4	Understand basics of registry and components.
03.06.5	Dates and Times.
03.07	MFT.
03.07.1	File storage mechanisms.
03.07.2	Date and Time.
03.08	EXT2, EXT3, and EXT4.
03.09	Optical media.
03.09.1	General Formats and Types.
03.09.2	Open and closed sessions.

04.0	Demonstrate proficiency in performing computer forensics investigations. – The student will be able to:
04.01	Create security incident handling and response policies.
04.02	Recover deleted, encrypted, or damaged file information as evidence for prosecution in computer crimes such as industrial espionage, E-mail fraud, and possession of pornography.
04.03	Deploy proprietary and/or open source tools to identify an intruder's footprints.
04.04	Coordinate incident response activities in cooperation with law enforcement agencies.
04.05	Prepare proper documentations of chain of custody, accounting for where each evidence item originated from, where it is going, and what entity has possession of the evidence.
04.06	Preserve forensic integrity of evidence so they can be admissible in court.
04.07	Model highest moral and ethical standards in conducting digital forensics investigations.
05.0	Demonstrate proficiency in performing mobile device forensics. – The student will be able to:
05.01	Preserve, acquire, and examine data stored on mobile devices.
05.02	Perform forensic acquisition and examination of SIM cards.
05.03	Apply forensic principles and tools to some of the most popular smart phones.
05.04	Demonstrate proficiency in using open-source and proprietary mobile device forensics tools.
05.05	Compare forensic acquisition tools and validate the completeness and accuracy of results.
05.06	Model forensic acquisition and examination of GPS navigation devices.
05.07	Utilize the results from mobile device forensics for internal investigations or in civic/criminal litigation.
06.0	Demonstrate proficiency in incident handling and response. – The student will be able to:
06.01	Design an incident response plan including: assessment, communication, containment, evaluation, recovery, and documentation.
06.02	Model information-hiding techniques.
06.03	Collect, seize, and protect evidence.
06.04	Recover data from various storage devices after physical and/or logical damage.
06.05	Search memory in real time with live and system forensics.
06.06	Investigate network traffic using log files, time analysis, sniffers, and other traffic analysis tools.

	06.07 Explain the legal considerations to investigating E-mails as prescribed in the Electronic Communications Privacy Act.
	06.08 Model E-mail tracing techniques in forensic investigations.
07.0	Identify key pieces of legislation and processes related to digital forensics. – The student will be able to:
	07.01 Representation of facts.
	07.02 Components of the Discovery Process.
	07.03 The 4th Amendment.
	07.04 Electronic Communications Privacy Act.
	07.05 Privacy Protection Act.
	07.06 Digital Millennium Copyright Act.
	07.07 18 USC 2703(d).
	07.08 Federal Rules of Evidence (basics).
	07.09 Review state to state licensing requirements for computer forensic professionals.
	07.10 Subpoenas.
	07.11 Search warrant.
	07.12 Consent.
	07.13 Legal process for civil and criminal cases.
	07.14 Expert Testimony and process.
	07.15 Daubert and Frye cases.
	07.16 Courtroom behavior.
08.0	Understand the tasks related to the casework process. – The student will be able to:
	08.01 Maintain evidence integrity.
	08.02 Image evidence.
	08.03 Ensure evidence image authenticity via hashing.

08.04 Sector slack space.
08.05 Text gathering.
08.06 Prepare examination media.
08.07 Process forensic image.
08.08 Document examination process.
08.09 Control/security and access logs for image media.
08.10 Disposition of evidence.
08.11 Prepare documents for trial.
08.12 Summation and Analysis sections.
08.13 Format examples.
08.14 Appendices and Glossaries.
08.15 Report preparation.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **IP Communications**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100120
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 32 credit hours; Secondary: 21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of IP Communication theory.
02.0 Demonstrate an understanding of digitizing voice traffic and voice compression standards.
03.0 Demonstrate an understanding of Quality of Service (QoS) requirements in a converged data and voice network.
04.0 Demonstrate an understanding of IP communications design.
05.0 Demonstrate an understanding of troubleshooting procedures for IP communications.
06.0 Demonstrate an understanding of utilizing advanced Voice over IP (VoIP) and Data Bundle solutions to provide a single network connection for phone services and high-speed Internet.
07.0 Demonstrate an understanding of using Statistical Analysis System (SAS) sessions to exchange data by using the TCP/IP communications access method.
08.0 Demonstrate how to configure VoIP fax applications for universal access servers.
09.0 Demonstrate an understanding of key concepts for Video over IP.

Florida Department of Education
Student Performance Standards

Program Title: **IP Communications**
CIP Number: **0511100120**
Program Length: **Primary: 32 credit hours; Secondary: 21 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (0511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of IP Communication theory. – The student will be able to:
01.01	Describe the supported multivendor hardware platforms for VoIP technology, their limits, and their boundaries.
01.02	Describe how Voice Gateways function in an IP Telephony (IPT) solution.
01.03	Identify and describe the Local Area Network (LAN) switching products useable in an IPT solution.
02.0	Demonstrate an understanding of digitizing voice traffic and voice compression standards. – The student will be able to:
02.01	Identify the steps required for analog to digital conversion in a VoIP network.
02.02	Identify the signaling steps required to complete a Public Switched Telephone Network (PSTN) call.
02.03	Define the function of Private Branch eXchanges (PBX) or key systems.
02.04	Configure Foreign eXchange Subscriber (FXS) and Foreign eXchange Office (FXO) interfaces on a Voice Gateway.
03.0	Demonstrate an understanding of Quality of Service (QoS) requirements in a converged data and voice network. – The student will be able to:
03.01	Identify the steps required to minimize jitter, packet loss and serialization delay in a VoIP network.
03.02	Explain the function of IP precedence and different Class of Service (CoS) types.
03.03	Identify and list the types of traffic coming into the interface and defining their relative priority.
03.04	Configure a priority or custom queuing list.

04.0	Demonstrate an understanding of IP communications design. – The student will be able to:
	04.01 Identify the most appropriate gateway in IP Communication design.
	04.02 Identify and describe dial plan architecture in IP Communication design.
	04.03 Identify the correct route patterns, filters, and use of wild cards in VoIP design scenarios.
	04.04 List available classes of services in IP Communication design and their constraints.
	04.05 Describe how to use digit manipulation in VoIP design.
	04.06 Identify the appropriate QoS tools that are needed for the proper operation of voice traffic on a network.
05.0	Demonstrate an understanding of troubleshooting procedures for IP communications. – The student will be able to:
	05.01 Identify the appropriate method for providing redundancy in VoIP design.
	05.02 Describe the tools used in troubleshooting IP communication networks.
	05.03 Identify and describing the different call flows and series of events through the call traces and debug outputs when troubleshooting.
	05.04 List the alarms used in IP communication troubleshooting.
06.0	Demonstrate an understanding of utilizing advanced Voice over IP (VoIP) and Data Bundle solutions to provide a single network connection for phone services and high-speed Internet. – The student will be able to:
	06.01 Identify the required bandwidth speeds needed for uninterrupted service and fast uploads and downloads.
	06.02 Describe the impact of Voice Samples, Codecs, and Packet Size on Bandwidth.
	06.03 Describe on demand use of voice/data and voice prioritization, delivered over a private/secure line.
	06.04 Describe features for a VoIP and Data Bundle.
	06.05 Describe VoIP and Data Bundle used to dynamically alternate between voice and Internet as call volume needs dictate.
07.0	Demonstrate an understanding of using Statistical Analysis System *(*SAS) sessions to exchange data by using the TCP/IP communications access method. – The student will be able to:
	07.01 Identify that a SAS/SHARE server ID has been added to the TCP/IP SERVICES file.
	07.02 Describe how to invoke SAS sessions utilizing TCP/IP communications access method.
	07.03 Describe syntax used to identify port numbers, defined in the client TCP/IP SERVICES file.

08.0	Demonstrate how to configure VoIP fax applications for universal access servers. – The student will be able to:	
	08.01	Describe fax applications that enable universal access servers to send and receive faxes across packet-based networks using modems.
	08.02	Describe universal inbox applications for fax and e-mail and how faxes and e-mails can go to the same mailbox using direct inward dialing.
	08.03	Describe how faxes can be broadcast to multiple recipients simultaneously.
09.0	Demonstrate an understanding of key concepts for Video over IP. – The student will be able to:	
	09.01	Describe video over IP systems using existing standards to reduce the data to a bitstream and then an IP network to carry the encapsulated data in a stream of IP packets.
	09.02	Describe the quality of service requirements which must be fulfilled for use in broadcast carrying video over IP networks.
	09.03	Describe bandwidth requirements, the maximum allowable packet loss rate, and approaches to achieve acceptable bandwidth such as quantity of service, network admission control, bandwidth reservation, traffic shaping, and traffic prioritization techniques.
	09.04	Describe latency variation and its effect on making synchronization more complex by making the recovery of the underlying timing of the video signal far more difficult.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Support Technician**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100121
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 21 credit hours; Secondary: 16 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1152 – Computer Network Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency in basic computer network maintenance and support.
02.0 Demonstrate a fundamental understanding of computer networking.
03.0 Demonstrate an understanding of common operating system concepts and associated practices.
04.0 Demonstrate fundamental proficiency in network security essentials.

Florida Department of Education
Student Performance Standards

Program Title: **Network Support Technician**
CIP Number: **0511100121**
Program Length: **Primary: 21 credit hours; Secondary: 16 credit hours**
SOC Code(s): **15-1152**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic computer network maintenance and support. – The student will be able to:
01.01	Describe the main computer components and their functions.
01.02	Describe the operation of computer systems, including input and output systems, file systems, device management, program loading and execution and data storage.
01.03	Demonstrate the safe and ethical use of computers.
01.04	Demonstrate proficiency in connecting to and safely using the Internet.
01.05	Describe emerging computer technologies and discuss their potential impact.
01.06	Implement proper procedures for handling and safeguarding equipment.
01.07	Describe procedures for proper disposal of computer components.
01.08	Install, configure, maintain and secure computer systems and peripherals following institutional protocol.
01.09	Configure and update firmware and ROM-BIOS.
01.10	Implement work order procedures.
01.11	Design and implement systems redundancy and data backups.
01.12	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
01.13	List the steps in problem solving.
01.14	Recognize and resolve basic computer configuration problems.

02.0	Demonstrate a fundamental understanding of computer networking. – The student will be able to:
02.01	Explain the use of binary numbers and perform binary arithmetic.
02.02	Describe current network environments.
02.03	Describe network communications and architecture.
02.04	Identify network components, media, connectors, applications and protocols.
02.05	Compare and contrast the OSI and TCP/IP reference models and their layers.
02.06	Identify and describe current relevant IEEE network standards.
02.07	Create an IP addressing scheme using Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
02.08	Identify and discuss issues related to networked environments, such as security, access control, fair use, privacy and redundancy.
02.09	Identify and discuss issues related to naming conventions for user IDs, email, passwords, and network hosts and devices.
02.10	Identify standard network topologies and describe the advantages and disadvantages of each topology.
02.11	Describe the major functions of LAN protocols.
02.12	Explain the functions of wireless components, standards, hardware, software, and infrastructure design.
02.13	Configure and manage the TCP/IP protocol stack.
02.14	Describe how TCP and UDP Port addresses, IP addresses, and MAC addresses function, and how they are used to deliver data across the network.
02.15	Identify emerging technologies and discuss related technical issues.
02.16	Design a local area network (LAN), including the specification of architecture, hardware and software.
02.17	Identify the advantages and use of virtual local area networks (VLANs).
02.18	Identify and explain wide area network (WAN) concepts.
02.19	Plan, configure and test a small network and establish baselines.
02.20	Describe the major functions of network server software components.
02.21	Install applications on a server and configure clients for network access.

03.0	Demonstrate an understanding of common operating system concepts and associated practices. – The student will be able to:
03.01	Describe the components and functions of major operating systems.
03.02	Compare and contrast major functions and features of current network operating systems (including directory services).
03.03	Install, configure and update client and server operating systems.
03.04	Describe the purpose and uses of computer virtualization.
03.05	Manage device drivers and software for peripheral devices.
03.06	Manage the network and firewall settings of a client.
03.07	Use an operating system for activities such as data and file management.
03.08	Identify current systems utilities and describe their functions.
03.09	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.10	Create, use, maintain, backup and restore system configuration files.
03.11	Describe procedures for uninstalling operating system software.
03.12	Install and configure client software for connecting to LANs, WANs, and the Internet.
03.13	Demonstrate knowledge of basic troubleshooting methodology.
04.0	Demonstrate fundamental proficiency in network security essentials. – The student will be able to:
04.01	Describe common security threats to, and vulnerabilities of, computer systems and the corresponding best practices for mitigation.
04.02	Define and describe malicious software and techniques to protect systems from its effects.
04.03	Describe Denial of Service attacks and means to defend against them.
04.04	Identify the risks and techniques of data loss and its prevention.
04.05	Describe the principles and techniques of securing data storage and transmission.
04.06	Identify current encryption and authentication standards.
04.07	Implement security policies, including compliance and operational security.
04.08	Enable access control, identity management and security logging.
04.09	Manage client and network system security software and related updates.

04.10 Describe the functions and characteristics of firewalls.
04.11 Perform a ping sweep to identify network hosts.
04.12 Perform a port scan to probe network hosts for open TCP and UDP ports.
04.13 Describe the purpose and operation of network protocol analyzers.
04.14 Utilize a network protocol analyzer to capture and analyze network traffic for security issues.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Linux System Administrator**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100122
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 24 credit hours; Secondary: 21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Understand and use essential tools.
02.0 Operate running systems.
03.0 Configure local storage.
04.0 Create and configure file systems.
05.0 Deploy, configure, and maintain systems.
06.0 Manage users and groups.
07.0 Manage security.

Florida Department of Education
Student Performance Standards

Program Title: **Linux System Administrator**
CIP Number: **0511100122**
Program Length: **Primary: 24 credit hours; Secondary: 21 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Understand and use essential tools. – The student will be able to:
01.01	Access a shell prompt and issue commands with correct syntax.
01.02	Use input-output redirection (>, >>, |, 2>).
01.03	Use grep and regular expressions to analyze text.
01.04	Access remote systems using SSH.
01.05	Log in and switch users in multiuser targets.
01.06	Archive, compress, unpack, and uncompress files using a variety of tools.
01.07	Create and edit text files.
01.08	Create, delete, copy, and move files and directories.
01.09	Create hard and soft links.
01.10	List, set, and change standard ugo/rwx permissions.
01.11	Locate, read, and use system documentation including man, info, and files in /usr/share/doc.
02.0	Operate running systems. – The student will be able to:
02.01	Boot, reboot, and shut down a system normally.
02.02	Boot systems into different targets manually.
02.03	Interrupt the boot process in order to gain access to a system.
02.04	Identify CPU/memory intensive processes, adjust process priority with renice, and kill processes.

02.05	Locate and interpret system log files and journals.
02.06	Perform various logging related activities such as configuring logging, log rotation and log reporting.
02.07	Access a virtual machine's console.
02.08	Discuss metric storage, collection, and display.
02.09	Explain the meaning and use of common metrics such as utilization values for CPU, memory, disk space, disk I/O, and network bandwidth.
02.10	Start and stop virtual machines.
02.11	Start, stop, and check the status of network services.
02.12	Securely transfer files between systems.
03.0	Configure local storage. – The student will be able to:
03.01	List, create,and delete partitions on MBR and GPT disks.
03.02	Create and remove physical volumes, assign physical volumes to volume groups, and create and delete logical volumes.
03.03	Configure systems to mount file systems at boot by Universally Unique ID (UUID) or label.
03.04	Create, use and remove snapshots of logical volumes.
03.05	Add new partitions and logical volumes, and swap to a system non-destructively.
03.06	Describe the differences between hard disks and solid-state disks, and issues related to both.
03.07	Compare different RAID levels.
03.08	Identify the features of Storage Area Networks (SANS) and Network Area Storage (NAS) and the common uses of these storage solutions.
04.0	Create and configure file systems. – The student will be able to:
04.01	Create, mount, unmount, and using various file systems.
04.02	Mount and unmount CIFS and NFS network file systems.
04.03	Extend existing logical volumes.
04.04	Create and configure set-GID directories for collaboration.
04.05	Create and manage Access Control Lists (ACLs).
04.06	Diagnose and correct file permission problems.

05.0	Deploy, configure, and maintain systems. – The student will be able to:
05.01	Configure networking and hostname resolution statically or dynamically.
05.02	Schedule tasks using at and cron.
05.03	Start and stop services and configure services to start automatically at boot.
05.04	Configure systems to boot into a specific target automatically.
05.05	Perform an unattended system install.
05.06	Configure a physical machine to host virtual guests.
05.07	Install Linux systems as virtual guests.
05.08	Configure systems to launch virtual machines at boot.
05.09	Configure network services to start automatically at boot.
05.10	Configure a system to use time services.
05.11	Install and update software packages from a remote repository or a local file system.
05.12	Update the kernel package appropriately to ensure a bootable system.
05.13	Modify the system bootloader.
06.0	Manage users and groups. – The student will be able to:
06.01	Create, delete, and modify local and global user accounts.
06.02	Change passwords and adjust password aging for local and global user accounts.
06.03	Create, delete, and modify local and global groups and group memberships.
06.04	Configure a system to use an existing authentication service for user and group information.
07.0	Manage security. – The student will be able to:
07.01	Describe security basic concepts and mechanisms, including encryption, password safety, message digests and system security requirements.
07.02	Practice proper security techniques and monitoring.
07.03	Configure firewall settings using firewall-config, firewall-cmd, or iptables.
07.04	Configure key-based authentication for SSH.

07.05	Set enforcing and permissive modes for SELinux.
07.06	List and identify SELinux file and process context.
07.07	Restore default file contexts.
07.08	Use boolean settings to modify system SELinux settings.
07.09	Diagnose and address routine SELinux policy violations.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Additional Resources

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Florida Department of Education
Curriculum Framework

Program Title: **Database & E-commerce Security**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100311
Program Type	College Credit Certificate (CCC)
Program Length	18 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the IT Security AS degree program (1511100307).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as Database Security Professionals and E-Commerce Security Professionals in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to work in Internet, intranet, extranet, and enterprise environments; installing, configuring, designing, and managing secure database and E-commerce resources.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of computer hardware.
02.0 Demonstrate an understanding of networked environments, hardware, and software.
03.0 Install and configure secure network systems software and utilities.
04.0 Demonstrate proficiency with Internet structure, organization, and navigation.
05.0 Demonstrate an understanding of network access control systems and methodology.
06.0 Describe cryptography concepts, standards, and applications.
07.0 Perform telecommunications and network security activities.
08.0 Demonstrate an understanding of Database Management Systems (DBMS).
09.0 Perform administrative tasks related to database security.
10.0 Demonstrate an understanding of E-commerce.
11.0 Perform tasks related to e-commerce security.
12.0 Perform web site management activities.
13.0 Design and implement physical security measures.
14.0 Perform operation and security management practices.
15.0 Employ applications and systems development security techniques.
16.0 Develop business continuity and disaster recovery plans.
17.0 Describe ethical issues, pertinent laws, and how to conduct investigations.
18.0 Perform general organizational computing workplace competencies.
19.0 Perform project planning and management activities.
20.0 Perform documentation and technical reference activities.
21.0 Demonstrate employability skills.
22.0 Demonstrate professional development skills.

Florida Department of Education
Student Performance Standards

Program Title: **Database & E-commerce Security**
CIP Number: **0511100311**
Program Length: **18 credit hours**
SOC Code(s): **15-1122**

This certificate program is part of the IT Security AS degree program (1511100307). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of computer hardware. – The student will be able to:
01.01	Describe multiple numbering systems used to represent instructions and data.
01.02	Identify the architecture of major hardware platforms.
01.03	Describe the functions of major hardware components of a computer system.
01.04	Discuss the potential impact of emerging hardware technologies.
01.05	Perform preventive maintenance tasks on microcomputer systems.
01.06	Set up and configure computer systems and peripherals.
01.07	Configure the Basic Input/Output System (BIOS) of a computer system.
01.08	Install and configure storage devices, controllers, and network interfaces.
02.0	Demonstrate an understanding of networked environments, hardware, and software. – The student will be able to:
02.01	Discuss fundamental network concepts such as topology, protocols, architecture, and internetworking.
02.02	Define all layers in the Open Systems Interconnect (OSI) and Transmission Control Protocol/Internetworking Protocol (TCP/IP) network protocol models.
02.03	Discuss the nature of Internetworking Protocol (IP) addresses and Media Access Control (MAC) addresses, and mapping between protocol addressing schemes.
02.04	Describe the functions and hardware requirements for current popular network servers for such services as: Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), email, the World Wide Web (WWW), and proxy.
02.05	Describe the major functions and hardware requirements of network client hardware components.
02.06	Describe current link technologies such as twisted-pair, coaxial, fiber optic, and wireless.
02.07	Describe the major functions of network connectivity hardware.
02.08	Describe the function of network storage devices, storage area networks (SAN), and other peripherals.

03.0	Install and configure secure network systems software and utilities. – The student will be able to:
03.01	Install and configure current leading system software, drivers, and service packs.
03.02	Install, configure and set up a proxy server and a gateway.
03.03	Discuss the functions of authentication protocols and Virtual Private Networks (VPNs).
03.04	Install and configure web servers and related services.
03.05	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.06	Install and configure a secure desktop client operating system (OS).
03.07	Describe modifications necessary to an OS such as modifying parameters and how to handle conflicting interrupts when installing, configuring, and upgrading typical applications software.
03.08	Install and configure client software for network-based applications such as email, web browsing, terminal emulation, file transfer, group conferencing and database.
03.09	Install and configure current popular network servers for such services as: Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), email, the World Wide Web (WWW) and proxy service.
04.0	Demonstrate proficiency with Internet structure, organization, and navigation. – The student will be able to:
04.01	Describe Internet structure and administration, including such topics as Requests for Comments (RFCs) and the Domain Name System (DNS).
04.02	Describe common Internet services and port numbers.
04.03	Demonstrate the use of internetworking protocols.
04.04	Differentiate between push and pull technologies.
04.05	Demonstrate the use of typical remote access mechanisms.
04.06	Describe the data format and proprietary nature of commonly used Internet file types.
04.07	Demonstrate use of Internet clients and services.
05.0	Demonstrate an understanding of network access control systems and methodology. – The student will be able to:
05.01	Specify by access control mechanisms what users can do, which resources they can access, and what operations they can perform on a system.
05.02	Compare and contrast access control techniques.
05.03	Administer computer, group, and user accounts.
05.04	Manage policies, rights, permissions, and passwords for users and/or groups of users.

05.05	Demonstrate an understanding of various access control models.
05.06	Manage password, PIN selection, maintenance, and control.
05.07	Demonstrate an understanding of methods of identification and authentication.
05.08	Implement centralized/remote authentication access controls.
05.09	Implement and manage decentralized access controls such as domain and trust relationships.
05.10	Analyze methods of server attacks.
05.11	Demonstrate an understanding of the different types of intrusions and the different methods of intrusion detection.
05.12	Monitor the network using various forms of intrusion detection resources to detect attacks.
05.13	Investigate audit trails for signs of network intrusions.
05.14	Perform penetration testing to find weaknesses in the access control systems.
06.0	Describe cryptography concepts, standards, and applications. – The student will be able to:
06.01	Demonstrate an understanding of the encryption/decryption process.
06.02	Demonstrate an understanding of the basic functions involved in key management.
06.03	Utilize various forms of cryptography, digital certificates, and digital signatures to achieve confidentiality, integrity, authentication, and non-repudiation in an enterprise data communications network.
06.04	Discuss the creation and use of digital certificates and digital signatures to provide authentication of users and verification of data integrity in network communications.
06.05	Identify the strengths and weaknesses of cryptographic algorithms and the effects of key length.
06.06	Employ cryptographic algorithms.
06.07	Implement current popular key distribution methods.
06.08	Utilize application and network-based protocols.
06.09	Describe the use of security hardware components.
07.0	Perform telecommunications and network security activities. – The student will be able to:
07.01	Utilize protocol layering models.
07.02	Evaluate the security implications involved with the various physical media types.
07.03	Describe security concerns with using various network topologies.

07.04	Configure authentication protocol service that provide dial-in authentication and security.
07.05	Employ network monitors and packet sniffers to identify security threats.
07.06	Implement security measures using network hardware and software.
07.07	Discuss the security vulnerabilities of the TCP/IP protocol stack.
07.08	Configure Network Layer security protocols.
07.09	Configure Transport Layer security protocols.
07.10	Utilize Application Layer security protocols.
07.11	Perform connection verification using current authentication protocols.
07.12	Demonstrate an understanding of how wide area network serial line protocols work.
07.13	Implement secure data communication techniques.
07.14	Develop secure email, facsimile, and voice communication procedures to protect against network attacks.
07.15	Employ alarms and signals to alert network security administrators of intrusions.
08.0	Demonstrate an understanding of Database Management Systems (DBMS). – The student will be able to:
08.01	Compare the major types of databases.
08.02	Describe relational database concepts.
08.03	Analyze the various components of a DBMS.
08.04	Install and configure database server software from leading vendors.
08.05	Perform database administration tasks using the Structured Query Language (SQL).
08.06	Demonstrate an understanding of transaction processing and concurrency control.
08.07	Perform database backup and recovery operations.
08.08	Employ techniques to ensure database integrity and security.
09.0	Perform administrative tasks related to database security. – The student will be able to:
09.01	Develop database security guidelines.
09.02	Monitor database security systems.

09.03	Manage web database security.
09.04	Verify security compliance.
09.05	Secure backup processes.
09.06	Verify backup processes.
10.0	Demonstrate an understanding of e-commerce. – The student will be able to:
10.01	Describe e-commerce and its impact on business and society.
10.02	Differentiate between the various e-commerce business models.
10.03	Describe the development of an e-commerce business plan.
10.04	Discuss e-commerce revenue streams and e-commerce market sectors.
10.05	Develop e-commerce marketing plan.
10.06	Discuss the steps necessary to maintain transaction integrity.
10.07	Identify components and procedures necessary to process credit card transactions.
10.08	Describe applicability of and compliance with Payment Card Industry Data Security Standards (PCI-DSS).
11.0	Perform tasks related to e-commerce security. – The student will be able to:
11.01	Manage digital certificates.
11.02	Maintain integrity in transaction storage and reporting systems.
11.03	Protect credit card, personal, banking, and bill to/ship to information in transaction processes.
11.04	Oversee inventory control.
11.05	Maintain email security related to e-commerce.
11.06	Review third-party transaction processing.
11.07	Assist in evaluating e-commerce platform vulnerabilities.
12.0	Perform webserver and site management activities. – The student will be able to:
12.01	Describe the process of obtaining an Internet domain name and mapping it to an Internet Protocol (IP) address.
12.02	Compare features of currently available web site management tools.

12.03	Configure current web server software.
12.04	Use current web server software to maintain secure web sites.
12.05	Use web site access tracking and analysis tools to evaluate the security of a web server.
13.0	Design and implement physical security measures. – The student will be able to:
13.01	Identify physical threats to an enterprise's resources.
13.02	Diagnose an enterprise's physical vulnerabilities.
13.03	Specify possible countermeasures to physically protect an enterprise's resources and sensitive information.
13.04	Develop a list of physical facility requirements to secure the premises.
13.05	Evaluate the applicability of technical controls.
14.0	Perform operation and security management practices. – The student will be able to:
14.01	Perform personnel administrative security operations.
14.02	Implement client and network system security software on an enterprise-wide basis.
14.03	Ensure backups of critical information.
14.04	Protect the privacy of personal data.
14.05	Demonstrate proper handling of sensitive information and media.
14.06	Demonstrate an understanding of different control types.
14.07	Determine what enterprise resources require protection.
14.08	Compare the advantages and disadvantages of internal versus external audits.
14.09	Perform compliance checks on user adherence to security policies.
14.10	Identify different types of enterprise-wide monitoring tools and techniques.
14.11	Utilize enterprise-wide monitoring tools and techniques.
14.12	Implement countermeasures to defend against threats.
14.13	Perform penetration testing activities.
14.14	Understand principles of risk management and asset valuation.

14.15	Monitor enterprise-wide information for potential liabilities.
14.16	Manage software licenses and enforce compliance within the organization.
15.0	Employ applications and systems development security techniques. – The student will be able to:
15.01	Describe the stages of the system development life cycle.
15.02	Understand security implications of structured programming techniques.
15.03	Analyze the controls that are included within systems and applications software and those used in the development of agents, applets, software, databases, data warehouses and knowledge-based systems.
15.04	Implement features to ensure data and application integrity, security and availability.
15.05	Analyze distributed environment application issues.
15.06	Analyze local environment application issues.
15.07	Analyze key database and data warehousing issues.
15.08	Develop multilevel security schemes for databases and data warehouses.
15.09	Compare different forms of data/information storage.
15.10	Describe different aspects of application and database security control architectures.
15.11	Understand the difference between elevated privileges and user modes of operation.
15.12	Identify various levels of application integrity.
15.13	Describe the impact that malicious code plays in software development.
15.14	Formulate countermeasures to defend against or detect malicious code.
15.15	Establish a secure development environment.
16.0	Develop business continuity and disaster recovery plans. – The student will be able to:
16.01	Perform a business impact assessment.
16.02	Specify the necessary capabilities of alternative business sites.
16.03	Develop business continuity, disaster containment, and recovery plans.
16.04	Understand the impact of scheduled facility maintenance on enterprise systems.
16.05	Develop a testing program for business continuity/disaster recovery plans.
16.06	Develop a training program for personnel regarding business continuity/disaster recovery plans.

17.0	Describe ethical issues, pertinent laws, and how to conduct investigations. – The student will be able to:
17.01	Understand the major categories and types of laws as they relate to information security.
17.02	Understand institutional policies and practices regarding data privacy and intellectual property rights.
17.03	Describe abnormal and suspicious activity as it relates to information security.
17.04	Analyze potential data security threats.
17.05	Understand legal institutional policies and practices to protect against purposeful violations of data integrity.
17.06	Identify the major categories of computer crimes and attacks.
17.07	Understand institutional policies and practices to conduct an investigation of security violations.
17.08	Discuss major ethical and legal issues related to Internet and system use.
18.0	Perform general organizational computing workplace competencies. – The student will be able to:
18.01	Deliver and follow oral and written technical instructions.
18.02	Prepare and deliver a technical presentation.
18.03	Participate in group discussions as a member and as a leader.
18.04	Understand the importance of self-motivation and responsibility in completing assigned tasks.
18.05	List the steps in problem solving.
18.06	Identify and discuss issues contained within professional codes of conduct.
18.07	Discuss ethical aspects of intellectual property rights and licensing issues.
18.08	Identify potential sources of employee/employer or employee/employer conflict and discuss possible approaches to resolve such disagreements.
18.09	Use appropriate courtesy, manners, and dress in the workplace.
18.10	Apply principles and techniques for being a productive, contributing member of a team.
18.11	Identify and use acceptable strategies for resolving conflict in the workplace.
18.12	Apply principles and techniques for working productively with people of diverse cultures and backgrounds.
18.13	Identify techniques for stress management and prevention of job burnout.
18.14	Use appropriate communication skills, telephone etiquette, courtesy, and manners when dealing with individuals of a technical background.

19.0	Perform project planning and management activities. – The student will be able to:
19.01	Apply effective time management skills.
19.02	Describe appropriate measures for planning and managing a large project.
19.03	Define an implementation schedule for a large project.
19.04	Describe appropriate measures for planning and implementing corporate-wide upgrade of hardware and software.
19.05	Identify examples of effective end-user training strategies and techniques.
20.0	Perform documentation and technical reference activities. – The student will be able to:
20.01	Use technical vocabulary appropriately.
20.02	Locate information in printed and online technical references.
20.03	Prepare documentation to track assets, security-related activities, and incidents.
21.0	Demonstrate employability skills. – The student will be able to:
21.01	Identify sources of employment opportunities.
21.02	Discuss employer expectations regarding attendance, punctuality, initiative and teamwork.
21.03	Discuss employee rights regarding privacy, discrimination, due process and safety.
21.04	Explain the importance of a written job description.
21.05	Identify methods for securing employment references.
21.06	Compose a cover letter and a resume.
21.07	Complete an electronic employment application.
21.08	Classify behaviors considered appropriate or inappropriate in a job interview situation.
21.09	Demonstrate job interview skills.
21.10	Compose a follow-up letter.
21.11	Compose a letter of resignation.
22.0	Demonstrate professional development skills. – The student will be able to:
22.01	Discover corporate strategies and policies.
22.02	Understand the importance of participating in professional organizations and maintaining professional contacts.

22.03 Develop mentor relationships.
22.04 Anticipate future industry trends.
22.05 Describe options for continuing education.
22.06 Read industry journals and magazines.
22.07 Understand the importance of attending seminars, workshops, and tradeshows.

Additional Information

Laboratory Activities

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Geographic Information System**
Career Cluster: **Information Technology**

CCC	
CIP Number	0545070213
Program Type	College Credit Certificate (CCC)
Program Length	21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Computer Information Technology AS degree program (1511010305).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the creation of maps; creation of geographic data files; manipulation of geographic data; and analysis of geographic data using appropriate software.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform general computer application activities.
02.0 Demonstrate an understanding of geographic coordinate systems.
03.0 Perform map creation activities.
04.0 Perform GIS data file creation activities.
05.0 Perform GIS data file manipulation activities.
06.0 Perform GIS analysis activities.
07.0 Perform database operations.

Florida Department of Education
Student Performance Standards

Program Title: **Geographic Information System**
CIP Number: **0545070213**
Program Length: **21 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the Computer Information Technology AS degree program (1511010305). At the completion of this program, the student will be able to:	
01.0	Perform general computer application activities. – The student will be able to:
01.01	Select the most efficient method of file organization for a given situation.
01.02	Identify security procedures to maintain integrity of files.
01.03	Create reports using a word processing application.
01.04	Analyze numerical information using a spreadsheet application.
01.05	Create a database for storing information using a database application.
01.06	Communicate using an e-mail program.
01.07	Retrieve information from the Internet.
02.0	Demonstrate an understanding of geographic coordinate systems. – The student will be able to:
02.01	Differentiate between different models for the shape of the earth.
02.02	Describe the characteristics of a global coordinate system.
02.03	Describe the characteristics of a geographic datum.
02.04	Compare and contrast different map projections.
02.05	Detail the characteristic of the Cartesian coordinate system.
02.06	Detail the UTM, UPS and State Plane coordinate systems.
03.0	Perform map creation activities. – The student will be able to:
03.01	Set the appropriate geographic coordinate system for a map in the GIS application.
03.02	Add geographic data layers to a GIS application.

	03.03 Manipulate data files that do not align correctly.
	03.04 Symbolize each layer appropriately.
	03.05 Label map features as needed.
	03.06 Add map components such as legends, titles, scale bars, north arrows.
	03.07 Publish the complete map in paper and electronic formats.
04.0	Perform GIS data file creation activities. – The student will be able to:
	04.01 Subset existing GIS data files to create new files.
	04.02 Combine existing, adjacent GIS data files together to create new files.
	04.03 Collect coordinate information using a GPS receiver in the correct geographical coordinate system.
	04.04 Create new GIS data files using coordinate information.
	04.05 Register aerial photographs or satellite images to a specific geographical coordinate system.
	04.06 Create new GIS data files by digitizing on top of registered images.
05.0	Perform GIS data file manipulation activities. – The student will be able to:
	05.01 Create, delete and move GIS files between folders and computers.
	05.02 Add metadata to GIS files.
	05.03 Set coordinate system information for a GIS file.
	05.04 Reproject GIS files to different coordinate systems.
	05.05 Add and delete fields to a GIS database.
	05.06 Manipulate values of field within the GIS database.
06.0	Perform GIS spatial analysis activities. – The student will be able to:
	06.01 Generalize maps by merging adjacent areas if they contain the same or similar attributes.
	06.02 Overlay GIS files that cover the same area to create new files.
	06.03 Create buffers around map features.
	06.04 Manipulate digital elevation models (DEM's) to create slope, aspect, view shed and hill shade layers.

	06.05 Create density maps from point features.
	06.06 Interpolate point features to create continuous surfaces.
	06.07 Generate spatial statistics on GIS files.
07.0	Perform database operations. – The student will be able to:
	07.01 Build a relational database.
	07.02 Query, display and format data.
	07.03 Save, retrieve and run queries.
	07.04 Build and format reports.
	07.05 Group and summarize data.
	07.06 Insert, update, automatically generate and delete data.
	07.07 Control transaction processing.
	07.08 Create, confirm, modify and remove tables to store data.
	07.09 Apply business rules to ensure data integrity.
	07.10 Restrict user access to tables.
	07.11 Improve query performance.
	07.12 Develop programs in PL/SQL.
	07.13 Insert and manipulate data with PL/SQL.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Accommodations

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
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Florida Department of Education
Curriculum Framework

Program Title: **E-Business Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120101
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the E-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform project management activities.
02.0 Understand issues related to e-Business.
03.0 Compare and contrast e-Business with traditional business.
04.0 Identify, classify and demonstrate management activities for e-Business.
05.0 Identify legal and ethical issues for e-Business.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Technical Certificate**
CIP Number: **0552120101**
Program Length: **24 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Perform project management activities. – The student will be able to:
01.01	Describe the role of project management (PM) within the organization.
01.02	Identify the strengths and weaknesses of various project life cycle designs.
01.03	Demonstrate the importance of project scope management.
01.04	Compare and contrast project selection methods.
01.05	Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe those different elements.
01.06	Compare and contrast types of cost estimates.
01.07	Examine cost control and earned value analysis.
01.08	Examine organizational planning, staff acquisition, and team development.
01.09	Examine risk identification, quantification, response development, and response control.
01.10	Compare and contrast project tracking and project reporting.
01.11	Understand change control and configuration control.
01.12	Understand subcontracting and outsourcing.
02.0	Understand issue related to e-Business. – The student will be able to:
02.01	Explain the difference between intranet and internet and the role of each in e-Business.
02.02	Explain the history, purpose and use of the World Wide Web and how it has enabled e-business.
02.03	Describe the rise of various e-business models such as information and content models, broadcast/content aggregations models, interactive models, and content provider models.

	02.04 Explain security issues related to electronic payment.
	02.05 Explain issues of advertising, marketing and solicitation activities affecting e-business.
03.0	Compare and contrast e-Business with traditional business. – The student will be able to:
	03.01 Define describe the evolution e-business.
	03.02 Describe how business operations have changed due to e-Business.
	03.03 Explain the basic business models of electronic marketing.
	03.04 Identify critical success factors for electronic marketing.
	03.05 Explain the impact of the Internet on customers and markets for businesses.
	03.06 Describe consumer buying behavior and organizational buying behavior.
	03.07 Explain how service industries conduct business electronically.
	03.08 Describe several innovative applications in the service sector.
	03.09 Identify the various payment options in e-commerce.
	03.10 Explain the strategic planning issues for e-business.
	03.11 Identify the critical success factors of an e-business project/venture.
	03.12 Describe the major components and impact of Web-based economics.
04.0	Identify, classify and demonstrate management activities for e-Business. – The student will be able to:
	04.01 Define the role of the entrepreneur in global business-in the United States and across the world.
	04.02 Describe the entrepreneurial profile.
	04.03 Discuss the role of the internet in helping small business expand their global market.
	04.04 Explain the importance of strategic management to a business.
	04.05 Describe the components of a marketing plan and explain the benefits of preparing one.
	04.06 Describe how to prepare financial statements & use them to manage the business.
	04.07 Describe effective pricing strategies.
	04.08 Discuss the links among pricing, image, and competition.

04.09	Explain what seed capital is and why it is so important to the entrepreneurial process.
04.10	Explain the difference in the three types of capital small businesses require: Fixed, Working and Growth.
04.11	Explain the stages in the location decision.
04.12	Describe the location criteria and outline the basic location options for retail and service business.
04.13	Explain purchasing, quality control, vender analysis and managing inventory while using technology to gain a competitive edge.
04.14	Explain the challenges involved in the entrepreneur's role as leader and what it takes to be a successful leader.
04.15	Learn management succession and risk management strategies in family business together with ethics and social responsibility.
04.16	Describe, explain and discuss business's responsibility to employees, customers, investors and the community.
04.17	Describe management's historical role in business operations.
04.18	Compare and contrast different management philosophies.
04.19	Compare and contrast the employees' personal needs with those of the organization.
04.20	Describe methods managers can use to deal with management politics.
04.21	Describe the nature of management's legal environment for traditional and electronic environments.
04.22	Describe the planning process of managers.
04.23	Discuss the characteristics and functions of an organization chart.
04.24	Describe the act and benefits of delegation.
04.25	Summarize the components of job descriptions and specifications.
04.26	Define and describe the activities involved in making a job analysis.
04.27	Discuss potential problems in evaluating employees and methods to avoid problems.
04.28	Discuss strategies managers may use to build and sustain high morale and motivation.
04.29	Describe methods of direct and indirect compensation.
04.30	Describe various employee relations practices.
04.31	Summarize strategies to improve personal and organizational communication.
04.32	Discuss the role of information systems in the control system.

04.33	Discuss the steps in the basic decision making process.
04.34	Describe several factors that influence decision-making.
04.35	Distinguish among management functions.
04.36	Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
04.37	Select the most effective communication systems.
04.38	Identify problems and make an appropriate decision.
05.0	Identify legal and ethical issues for e-Business. – The student will be able to:
05.01	Describe the procedure to obtaining protection under intellectual property law.
05.02	Describe and recognize material that is defamatory.
05.03	Explain the right of publicity and the right of privacy.
05.04	Explain copyright assignment and the Visual Artists Rights Act.
05.05	Discuss licensing and registration issues.
05.06	Describe the importance in choosing a strong trademark.
05.07	Understand basic laws that apply to e-commerce.
05.08	Discuss the permission required for linking, revenue-sharing agreements, and liability issues pertaining to linking.
05.09	Explain other liability issues for ISPs.
05.10	Differentiate trademark protection and trade secret protection for their property.

Additional Information

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **E-Business Security Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120102
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the E-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Design, develop and implement physical, network, host, application, and user security systems for E-Business.
02.0 Maintain and monitor security policies.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Security Technical Certificate**
CIP Number: **0552120102**
Program Length: **24 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Design, develop and implement physical, network, host, application and user security systems for e-business. – The student will be able to:
01.01	Explain use and purpose of security policies.
01.02	Conduct a security audit.
01.03	Control access to systems, resources and data.
01.04	Explain and manage system security in common Operating Systems.
01.05	Describe concepts of web servers and their role in the network.
01.06	Plan and implement a web server.
01.07	Identify the various hardware and software requirements for a web server.
01.08	Explain how documents and files are stored on a web server.
01.09	Describe different methods for projecting future traffic on a web server.
01.10	Identify the necessary steps to ensure reliability and response of the server.
01.11	Describe and implement the process for effectively organizing a web site.
01.12	Install, configure, and maintain a Web server.
01.13	Publish a web document so that it is easily located through various search engines on the Internet.
01.14	Set up the web server so that dynamic content can be provided to users of the web site.
01.15	Perform corrective and preventative maintenance on a web server.
01.16	Analyze server log files to determine trends in web server utilization.

01.17	Discuss Internet services operation and the security risk imposed by them on the network.
01.18	Identify vulnerabilities in World Wide Web protocols and counter-measures for securing them.
01.19	Describe the operation of electronic mail and news services protocols and how to effectively secure them.
01.20	Describe the operation of file transfer and printing service protocols and how to effectively secure them.
01.21	Describe the operation of remote access services protocols and how to effectively secure them.
01.22	Describe the operation of real-time conferencing service protocols and how to effectively secure them.
01.23	Properly configure and describe the operation of naming and directory services.
01.24	Describe the operation of authentication and auditing services protocols and how to effectively secure them.
01.25	Describe the operation of administrative services protocols and how to effectively secure them.
01.26	Describe the operation of the IP Security protocol.
01.27	Implement effective measures to secure various service protocols.
02.0	Maintain and monitor security policies. – The student will be able to:
02.01	Identify basic network security.
02.02	Describe purpose and use of packet sniffing, firewalls and proxies.
02.03	Define web server security.
02.04	Protect against the risks of directory browsing.
02.05	Assess client security issues including ActiveX, JavaScript and Cookies.
02.06	Install and configure network security tools.
02.07	Explain the strengths, and weaknesses of cryptography as a security tool.
02.08	Describe authentication and identification schemes.
02.09	Define secure software.
02.10	Describe the use and purpose of encryption.
02.11	Define the advantages of Secure Socket Layer (SSL).
02.12	Define certificate authority.

02.13	Identify basic aspects of intrusion detection and steps to protect the web server from these threats.
02.14	Explain the history of cryptographic methodology.
02.15	Describe cryptographic attack models.
02.16	Describe the secret key and public key encryption methodology.
02.17	Use hashing techniques.
02.18	Use digital signatures in a network environment.
02.19	Explain applied cryptography.
02.20	Use authentication processes in heterogeneous environments.
02.21	Create secure environment through defensive programming.
02.22	Explain the basic elements of Security Testing and Auditing.
02.23	Describe the capabilities of effective signature filter techniques.
02.24	Explain the importance of architectural design detection of intrusions.
02.25	Describe interoperability aspects of various commercial IDS solutions.
02.26	Define and utilize various network based Intrusion Detection Solutions (IDS).
02.27	Detect various exploitation attempts in a network environment.
02.28	Explain intrusion detection and denial of service.
02.29	Describe techniques for gathering intelligence on intrusion detection and the latest tools and techniques used by hackers.
02.30	Define and recognize structured attacks and differentiate from unstructured attacks.
02.31	Explain management issues related to intrusion detection.
02.32	Implement appropriate security measures following risk analysis.
02.33	Implement appropriate security measures to minimize risks from hackers.
02.34	Issue and manage digital certificates.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **E-Business Software Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120103
Program Type	College Credit Certificate (CCC)
Program Length	21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the E-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform project management activities.
02.0 Conduct systems analysis and design.
03.0 Use various software applications, languages, and protocols for E-Business environment.
04.0 Develop software applications for E-Business environment.
05.0 Maintain systems quality and perform testing activities.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Software Technical Certificate**
CIP Number: **0552120103**
Program Length: **21 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Perform project management activities. – The student will be able to:
01.01	Describe the role of project management (PM) within the organization.
01.02	Identify the strengths and weaknesses of various project life cycle designs.
01.03	Understand the importance of project scope management.
01.04	Compare and contrast project selection methods.
01.05	Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe those different elements.
01.06	Compare and contrast types of cost estimates.
01.07	Examine cost control and earned value analysis.
01.08	Examine organizational planning, staff acquisition, and team development.
01.09	Examine risk identification, quantification, response development, and response control.
01.10	Compare and contrast project tracking and project reporting.
01.11	Understand change control and configuration control.
01.12	Understand subcontracting and outsourcing.
01.13	Discuss and analyze project management case study.
02.0	Conduct systems analysis and design. – The student will be able to:
02.01	Perform a detailed systems investigation and analysis of the project.
02.02	Design the input and output for the system.

02.03	Design the data files for the systems.
02.04	Design the processing flow of the system.
02.05	Design a system to insure that only valid data is accepted and processed, completely and accurately.
02.06	Establish a project plan for the development and implementation of the systems.
02.07	Program and test the system.
02.08	Develop the final systems documentation.
02.09	Conduct necessary training and file conversion to properly implement the system.
02.10	Understand industry-standard models for developing and maintaining software such as the Capability Maturity Model.
02.11	Be able to use industry-standard tools and systems development tools.
03.0	Use various programming software applications, languages and protocols for E-Business environment. – The student will be able to:
03.01	Explain the network protocols.
03.02	Explain how applets differ from applications in terms of program form, operating context, and how they are started.
03.03	Describe and use single- and multi-dimensional arrays.
03.04	Create classes that use inheritance aspects of the object-oriented paradigm.
03.05	Describe the error handling constructs.
03.06	Write a program that reads and writes text files.
03.07	Understand the hierarchy of classes designed for aggregate data such as Collections, and use sets and lists.
03.08	Identify deprecated classes, and explain how to migrate.
03.09	Explain and use event handling in a GUI.
03.10	Differentiate between client-side scripting and server-side scripting.
03.11	Manipulate the objects contained in the Document Object Model (DOM).
03.12	Use variables, constants, and arithmetic operators to create valid arithmetic expressions.
03.13	Dynamically alter the sequence of script execution.
03.14	Use built-in functions as well as create custom functions, subroutines, and procedures within software using scripting languages.

03.15	Create server pages.
03.16	Write programs that implement network connection objects.
03.17	Create and use server-side include files.
03.18	Create programs that communicate across the Internet using conventions such as Remote Method Invocation.
03.19	Understand appropriate use of and demonstrate ability to incorporate and utilize cookies in e-Business software.
03.20	Integrate standard object model components with server pages.
03.21	Create web pages using data from a database.
03.22	Implement programs that use local or remote databases with standard protocols.
03.23	Create applications such as Servlets that send HTML pages to Internet clients.
03.24	Use a scripting language on the server side of a distributed program.
03.25	Use a scripting language on the client side of a distributed program.
03.26	Implement levels of security in distributed software applications and applets.
03.27	Read simple UML diagrams, and create UML documents that model programs.
03.28	Use built-in objects for error handling, file creation, and dictionary access in e-Business software.
03.29	Understand the use of client-side operating system tools.
03.30	Produce software that can interface with operating system services used to broadcast messages within a domain.
03.31	Utilize appropriate operating system interfaces to redirect output.
03.32	Explain and emplement emerging trends in XML-related technologies.
03.33	Explain and use the different elements that make code easier to read.
03.34	Explain and use the different data types available in scripting languages.
03.35	Explain and use standard control structures such as repetition, selection, and sequence in the appropriate programming language.
03.36	Output data from scripting languages.
03.37	Explain the benefits of using subroutines and libraries in code.
03.38	Debug code from scripting languages.

03.39	Explain basic Internet and server-side scripting security issues and common techniques to fix them.
03.40	Use a scripting language to create and manage form data submitted over the Internet.
03.41	Examine the use of shopping carts on the Internet and how scripting languages.
03.42	Examine the use of auctions via the Internet and how scripting languages.
03.43	Understand industry standard program design techniques.
03.44	Develop the logic for a program using both flowcharting and pseudo code.
03.45	Develop looping and nested looping logic.
03.46	Develop the logic of: three-level control break program, an extract program, an edit program, a file matching and an update program.
04.0	Develop software applications for E-Business environment. – The student will be able to:
04.01	Design software applications that are accessible by a variety of wireless and wired devices.
04.02	Explain alternatives to dynamic content.
04.03	Integrate the push model of information delivery.
04.04	Use operating system services such as a personal web server for database development.
04.05	Explain server security and permissions.
04.06	Evaluate the advantages / disadvantages of different server platforms.
04.07	Explain scripting concepts and syntax.
04.08	Connect to common databases using standard protocols.
04.09	Display data from a database using a Web interface.
04.10	Write and modify a database record using a Web interface.
04.11	Enable Web security features.
04.12	Design and implement a basic shopping cart application.
05.0	Maintain systems quality and perform testing activities. – The student will be able to:
05.01	Identify the advantages and disadvantages of client-server computing.
05.02	Establish controls in a client-server framework.

05.03 Explain software testing methodology.
05.04 Describe the planning, executing and controlling of the testing process.
05.05 Perform Graphical User Interface testing.
05.06 Explain the server applications testing processes.
05.07 Explain testing in a networked application environment.
05.08 Incorporate cross-level functional testing within a data-driven framework-based environment.
05.09 Use client-server testing metrics.
05.10 Explain testing integration on the desktop.
05.11 Explain testing for web-based client-server applications.
05.12 Select and use appropriate automated test tools.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **E-Business Technology Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120104
Program Type	College Credit Certificate (CCC)
Program Length	21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the E-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform project management activities.
02.0 Demonstrate proficiency in the use of web browsers and access to Internet resources.
03.0 Conduct systems analysis and design.
04.0 Perform Web server management activities.
05.0 Support E-Business applications and product development.
06.0 Maintain network infrastructure.
07.0 Perform technical requirements to support UNIX operating system.
08.0 Maintain systems quality and perform testing activities.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Technology Technical Certificate**
CIP Number: **0552120104**
Program Length: **21 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:
01.0 Perform project management activities. – The student will be able to:
01.01 Describe the role of project management (PM) within the organization.
01.02 Identify the strengths and weaknesses of various project life cycle designs.
01.03 Understand the importance of project scope management.
01.04 Compare and contrast project selection methods.
01.05 Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe those different elements.
01.06 Compare and contrast types of cost estimates.
01.07 Demonstrate cost control and earned value analysis.
01.08 Examine organizational planning, staff acquisition, and team development.
01.09 Examine risk identification, quantification, response development, and response control.
01.10 Compare and contrast project tracking and project reporting.
01.11 Understand change control and configuration control.
01.12 Understand subcontracting and outsourcing.
01.13 Discuss and analyze project management case study.
02.0 Demonstrate proficiency in the use of web browsers and access to internet resources. – The student will be able to:
02.01 Describe proper Internet etiquette and usage.
02.02 Explain how to connect to the Internet.

02.03	Explain the purpose and use of browsers and search engines.
02.04	Understand and use web browser tools to navigate the web.
02.05	Demonstrate proficiency in electronic communication technologies by using email, setting up email accounts, and explaining communication and privacy issues specific to email.
02.06	Explain communication issues specific to email.
02.07	Participate in an email a web-based discussion group.
02.08	Explain the guidelines for evaluating information needs before beginning a search an electronic search.
02.09	Explain issues associated with pornography, free speech, censorship, filtering, and copyright on the web.
02.10	Describe how to critically evaluate online information content.
02.11	Capture images, text, sound, and data from web pages.
02.12	Work with File Transfer Protocol (FTP) clients.
03.0	Conduct systems analysis and design. – The student will be able to:
03.01	Perform a detailed systems investigation and analysis of the project.
03.02	Design the input and output for the system.
03.03	Design the data files for the systems.
03.04	Design the processing flow of the system.
03.05	Design a system to insure that only valid data is accepted and processed, completely and accurately.
03.06	Establish a project plan for the development and implementation of the systems.
03.07	Program and test the system.
03.08	Develop the final systems documentation.
03.09	Conduct necessary training and file conversion to properly implement the system.
03.10	Understand industry-standard models for developing and maintaining software.
03.11	Use industry-standard systems development tools.

04.0	Perform Web Server Management activities. – The student will be able to:
	04.01 Perform console management in the author and user mode.
	04.02 Create and navigate a custom management console.
	04.03 Create new user accounts.
	04.04 Implement groups into a domain.
	04.05 Change the domain mode.
	04.06 Manage software settings, scripts, and security settings.
	04.07 Manage administrative templates.
	04.08 Manage folder redirection.
	04.09 Configure and administer network printers.
05.0	Support e-Business applications and product development. – The student will be able to:
	05.01 Identify the different components to systems development life cycle and how they are interrelated.
	05.02 Identify deliverables for user project and build subprojects within lifecycle components.
	05.03 Create physical structure of web-based architecture.
	05.04 Create requirements for business request, develop web components necessary to satisfy request and test for acceptance.
	05.05 Use web browser and web authoring tools.
	05.06 Write required queries to get required answer sets.
06.0	Maintain network infrastructure. – The student will be able to:
	06.01 Identify web server hardware and evaluate performance.
	06.02 Describe security threat countermeasures.
	06.03 Identify basic components of electronic payment systems.
	06.04 Identify how to create and maintain an effective web presence and brand.
	06.05 Describe various Electronic Data Interchange components.
	06.06 Define and explain virtual communities and web portals.

	06.07 Identify challenges of a global business regarding culture, legal and financial impacts, and differing languages.
	06.08 Identify the planning stages of the e-Business project.
	06.09 Identify web server hardware and evaluate performance.
07.0	Perform technical requirements to support UNIX operating system. – The student will be able to:
	07.01 Explain basic command syntax for governing the file-system, printing and process control.
	07.02 Identify and use editors.
	07.03 Schedule and reprioritize processes.
	07.04 Use commands to get information and communicate with remote users.
	07.05 Search for strings of text in files using shell meta-characters.
	07.06 Use common tools to generate reports or filter text.
	07.07 Use shell scripts to control flow, input, output and jobs.
	07.08 Troubleshoot system problems.
08.0	Maintain systems quality and perform testing activities. – The student will be able to:
	08.01 Identify the advantages and disadvantages of client-server computing.
	08.02 Establish controls in a client-server framework.
	08.03 Explain software testing methodology.
	08.04 Describe the planning, executing and controlling of the testing process.
	08.05 Perform Graphical User Interface testing.
	08.06 Explain the server applications testing processes.
	08.07 Explain testing in a networked application environment.
	08.08 Incorporate cross-level functional testing within a data-driven framework-based environment.
	08.09 Use client-server testing metrics.
	08.10 Explain testing integration on the desktop.
	08.11 Explain testing for web-based client-server applications.
	08.12 Select and use appropriate automated test tools.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

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Accommodations

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Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
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Florida Department of Education
Curriculum Framework

Program Title: **E-Business Ventures Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120105
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the e-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Understand issues related to e-Business.
02.0 Compare and contrast e-Business with traditional business.
03.0 Identify, classify, and demonstrate management activities for e-Business.
04.0 Identify legal and ethical issues for e-Business.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Ventures Technical Certificate**
CIP Number: **0552120105**
Program Length: **24 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Understand issues related to e-Business. – The student will be able to:
01.01	Explain the difference between intranet and internet and the role of each in e-Business.
01.02	Explain the history, purpose and use of the World Wide Web and how it has enabled e-Business.
01.03	Describe the rise of various e-Business models such as information and content models, broadcast/content aggregations models, interactive models, and content provider models.
01.04	Explain security issues related to electronic payment.
01.05	Explain issues of advertising, marketing and solicitation activities affecting e-Business.
02.0	Compare and contrast e-Business with traditional business. – The student will be able to:
02.01	Describe the evolution of e-Business, how it changed the marketplace, and the benefits to society.
02.02	Define e-Business and its categories.
02.03	Describe how business operations have changed due to e-Business.
02.04	Explain the basic business models of electronic marketing.
02.05	Identify critical success factors for electronic marketing.
02.06	Explain the impact of the Internet on customers and markets for businesses.
02.07	Describe consumer buying behavior and organizational buying behavior.
02.08	Explain how service industries conduct business electronically.
02.09	Describe several innovative applications in the service sector.
02.10	Explain how business-to-business commerce is conducted.

	02.11 Describe the application and key technologies for business- to-business e-commerce models.
	02.12 Describe the relationship between the Internet, intranet and extranet.
	02.13 Describe the typical electronic payment system.
	02.14 Identify the various payment options in e-commerce.
	02.15 Explain the strategic planning issues for e-Business.
	02.16 Identify the critical success factors of an e-Business project/venture.
	02.17 Discuss contractual issues and copyright infringement on the Web.
	02.18 Explain the global economics and its impact e-Business.
	02.19 Describe the major components and impact of Web-based economics.
03.0	Identify, classify and demonstrate management activities for e-Business. – The student will be able to:
	03.01 Define the role of the entrepreneur in business-in the United States and across the world.
	03.02 Describe the entrepreneurial profile.
	03.03 Discuss the role of the internet in helping small business expand their market opportunities both in the United States and abroad.
	03.04 Explain the importance of strategic management to business.
	03.05 Describe the components of a marketing plan and explain the benefits of preparing one.
	03.06 Describe how to prepare financial statements & use them to manage the business.
	03.07 Describe effective pricing strategies.
	03.08 Discuss the links among pricing, image, and competition.
	03.09 Explain what seed capital is and why it is so important to the entrepreneurial process.
	03.10 Explain the difference in the three types of capital that small businesses require: Fixed, Working and Growth.
	03.11 Explain the stages in the location decision.
	03.12 Describe the location criteria and outline the basic location options for retail and service business.
	03.13 Explain purchasing, quality control, vender analysis and managing inventory while using technology to gain a competitive edge.
	03.14 Explain the challenges involved in the entrepreneur's role as leader and what it takes to be a successful leader.

03.15	Learn management succession and risk management strategies in family business together with ethics and social responsibility.
03.16	Describe, explain and discuss business's responsibility to employees, customers, investors and the community.
03.17	Describe management's historical role in business operations.
03.18	Compare and contrast different management philosophies.
03.19	Compare and contrast the employees' personal needs with those of the organization.
03.20	Describe methods managers can use to deal with management politics.
03.21	Describe the nature of management's legal environment for traditional and electronic environments.
03.22	Describe the planning process of managers.
03.23	Discuss the characteristics and functions of an organization chart.
03.24	Describe the act and benefits of delegation.
03.25	Summarize the components of job descriptions and specifications.
03.26	Define and describe the activities involved in making a job analysis.
03.27	Discuss potential problems in evaluating employees and methods to avoid problems.
03.28	Discuss strategies managers may use to build and sustain high morale and motivation.
03.29	Describe methods of direct and indirect compensation.
03.30	Describe various employee relations practices.
03.31	Summarize strategies to improve personal and organizational communication.
03.32	Discuss the role of information systems in the control system.
03.33	Discuss the steps in the basic decision making process.
03.34	Describe several factors that influence decision-making.
03.35	Distinguish among management functions.
03.36	Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
03.37	Select the most effective communication systems.
03.38	Identify problems and make an appropriate decision.

04.0	Identify legal and ethical issues for e-Business. – The student will be able to:
04.01	Describe the procedure to obtaining protection under each intellectual property law.
04.02	Describe and recognize material that is defamatory.
04.03	Explain the right of publicity and the right of privacy.
04.04	Explain copyright assignment and the Visual Artists Rights Act.
04.05	Discuss licensing text, photos, films, television clips, characters, and games, Domain name registration, cybersquatting and anti-cybersquatting regulations.
04.06	Describe the importance in choosing a strong trademark.
04.07	Understand basic laws that apply to e-commerce.
04.08	Explain how Article Two of the UCC that applies to the sale of goods involved in e-Business.
04.09	Discuss current US laws that regulate e-Business, such as the Uniform Computer Information Transactions Act, clickwraps, sales tax, and advertising.
04.10	Explain the meaning of linking, framing and caching.
04.11	Discuss the permission required for linking, revenue-sharing agreements, and liability issues pertaining to linking.
04.12	Discuss e-mail litigation, including anti-spam laws.
04.13	Describe licensing music for use.
04.14	Discuss copyright issues important to ISPs.
04.15	Explain other liability issues for ISPs, such as, defamation, privacy, trademark and patent.
04.16	Discuss when to use trademark protection and trade secret protection for their property.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Computer Information Data Specialist**
Career Cluster: **Information Technology**

CCC	
CIP Number	0611050101
Program Type	College Credit Certificate (CCC)
Standard Length	9 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1051 – Computer Systems Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this program is to prepare students for initial employment as a computer systems analyst. This program may also be used to provide supplemental training for persons previously or currently employed in these occupations.

This certificate program is part of the Computer Information Technology AS degree program (1511010307).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to microcomputer oriented operating procedures, software applications packages, and hardware in order to select the appropriate information technology equipment for a particular microcomputer-based work environment; install information technology equipment, troubleshoot information technology equipment, and support information technology users.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components.
02.0 Install, configure and troubleshoot system and device driver software and implement basic security measures.
03.0 Create and maintain database objects, store, retrieve and manipulate data stored in a relational database.
04.0 Demonstrate knowledge of networking technologies, networking hardware, and data communication concepts, protocols, and routing methods.

Florida Department of Education
Student Performance Standards

Program Title: **Computer Information Data Specialist**
CIP Number: **0611050101**
Program Length: **9 credit hours**
SOC Code(s): **15-1121**

This certificate program is part of the Computer Information Technology AS degree program (1511010307). At the completion of this program, the student will be able to:	
01.0	Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components. – The student will be able to:
01.01	Describe the architecture and operation of a typical computer system.
01.02	Describe the use of binary numbers to represent instructions and data and the hardware implications.
01.03	Identify various coding schemes including ASCII and other data types.
01.04	Describe and identify motherboards and their components.
01.05	Describe the features and types of computer form factors, chassis, power supplies and cooling devices.
01.06	Describe and identify mass storage devices.
01.07	Distinguish between the different display devices and their characteristics.
01.08	Summarize the function and types of adapter and interface cards.
01.09	Construct and configure a computer system from individual components.
01.10	Perform file and system management tasks, system imaging, data backup, and use command-line utilities to manage and maintain a computer, its partitions, directories, and files.
01.11	Install system updates, device drivers, anti-virus and anti-spyware software, and other management and monitoring software to the operating system.
01.12	Perform the installation, configuration, optimization, maintenance, and upgrading of printers and other peripheral devices.
01.13	Troubleshoot new and existing computers and peripheral devices, and document the problems discovered and the solutions implemented.
01.14	Troubleshoot client-side network connectivity issues using appropriate tools.
01.15	Identify potential hazards and implement proper safety procedures, including electrostatic discharge (ESD) precautions and professional operational procedures, safe work environment and equipment handling.

02.0	Install, configure and troubleshoot system and device driver software and implement basic security measures. – The student will be able to:
02.01	Describe the various types of device drivers used by operating systems and the utilities used to install, configure, manage, upgrade and troubleshoot system devices.
02.02	Describe the device and driver installation process.
02.03	Identify, install, configure, and troubleshoot device drivers.
02.04	Verify digital signatures of device drivers.
02.05	Configure driver policies.
02.06	Describe the security tools and features in operating systems and how to access them to perform a security audit and update.
02.07	Install, configure and monitor firewalls to block dangerous incoming and outgoing network traffic.
02.08	Install, configure and monitor anti-virus software.
02.09	Perform anti-virus and other security scanning activities to prevent the infiltration of spyware and other malicious software.
02.10	Install, configure and monitor updates, and perform system audits.
02.11	Install, configure, upgrade, monitor and optimize security measures and policies.
02.12	Perform preventive maintenance and activity monitoring for computer and network security.
03.0	Create and maintain database objects, store, retrieve and manipulate data stored in a relational database. – The student will be able to:
03.01	Define what a database is and describe the components and structures of relational databases.
03.02	Explain the fundamental concepts of database design.
03.03	Design a relational database with multiple tables.
03.04	Determine the appropriate field data type and field size for fields in a table.
03.05	Create and modify tables, queries, forms and reports.
03.06	Insert, update, and delete data and records.
03.07	Create basic table relationships and relate tables in a database.
03.08	Identify the data elements by which to relate tables.
03.09	Describe foreign keys and their use when relating tables.
03.10	Interpret an entity relationship diagram for modeling a database.

03.11	Describe the purpose of SQL statements.
03.12	Define, describe and implement a query.
03.13	Write and implement basic queries formatted for specific output.
03.14	Retrieve information from a database by using query and filter tools.
03.15	Describe the use of SELECT statements including the use of various JOIN, SUBQUERIES, and conditional expressions.
03.16	Describe the advantages of using an index, and implement different types of indexes on tables.
03.17	Perform basic database maintenance.
03.18	Monitor and analyze database performance.
03.19	Backup and restore a database.
04.0	Demonstrate knowledge of networking technologies, networking hardware, and data communication concepts, protocols, and routing methods. – The student will be able to:
04.01	Identify the advantages and disadvantages of networked and non-network environments.
04.02	Describe current networked environments, such as peer-to-peer and client/server.
04.03	Identify and discuss issues such as security, privacy and redundancy related to networked environments.
04.04	Identify and discuss issues related to naming conventions for domains, hosts, users, email, and network devices.
04.05	Differentiate between telecommunications and data communications.
04.06	List and define the layers in the OSI and TCP/IP network protocol models.
04.07	Identify and describe current relevant IEEE network standards.
04.08	Describe and illustrate the typical logical and physical network topologies, and explain the advantages and disadvantages of each topology.
04.09	Describe the major functions and implementation of LAN hardware protocols such as Ethernet, and identify the physical components currently in use.
04.10	Describe the LAN software protocols in current use.
04.11	Discuss the characteristics of IP addresses and MAC addresses, and mapping between protocol addressing schemes.
04.12	Differentiate between hardware used to implement different network topologies, including bus, ring and star.
04.13	Identify and describe the current cable technologies, including shielded and unshielded twisted-pair, coaxial, and fiber optic, and their features including bandwidth, performance, plenum characteristics, and interference rejection.

04.14	Describe current wireless technologies including Wi-Fi, blue tooth, satellite, microwave, radio and infrared.
04.15	Describe the advantages and disadvantages of wireless and cable technologies, and identify the environments best suited for each technology.
04.16	Describe the functions and characteristics of network connectivity hardware, included hubs, repeaters, bridges, switches, access units, routers, and gateways.
04.17	Describe the hardware needed to connect a local area network to a wide area network and the Internet.
04.18	Compare and contrast major functions and features of current network operating systems, including directory and other services.
04.19	Describe the major functions of network server hardware and software components.
04.20	Install and configure a network server, including the installation of network hardware and software.
04.21	Describe the major functions of network client hardware and software components.
04.22	Install and configure network client software on multiple computer platforms with support for multiple network protocols.
04.23	Describe the function of network storage devices and other peripherals, including NAS, SAN, RAID, tape backup, printers, telecommunications devices, scanners, copiers, imaging devices, and document center equipment.
04.24	Install and configure storage devices and other peripherals with network access.
04.25	Install, configure, update and troubleshoot network drivers for network hosts and peripherals.
04.26	Configure and troubleshoot network protocol stacks.
04.27	Describe the characteristics of the current wide area network technologies and determine the most suitable WAN technology for a given situation.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a “transfer value” assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other. For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp .

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Computer Information Technology**
Career Cluster: **Information Technology**

AS	
CIP Number	1511010305
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1121 – Computer Systems Analysts
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a PC Support Technician, help desk technician, user support analyst, applications system analyst, information systems specialist, technical support analyst, computer information manager, user support supervisor, computer systems analyst, customer service representative, computer operator, computer repair technicians, computer sales person, help desk office supervisor, office systems support specialist, software tester, software trainer, user support specialist information security specialist in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to analyze microcomputer oriented operating procedures, software applications packages, and hardware in order to devise efficient methods to manage a microcomputer-based work environment; develop new systems to meet projected needs; select and install information technology equipment, troubleshoot information technology equipment, manage and support information technology users.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two specializations with one common core. It is recommended that students complete the core or demonstrate a mastery of the student performance standards contained in the core before advancing to the course(s) in the next level of specialization. The common core consists of technical core skills from the following areas: computer maintenance and support, networking fundamentals, operating systems, web page authoring, database applications and fundamentals of project management. The total Associate in Science degree program(s) consists of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate how to use current productivity software applications including word processing, spreadsheets, database, presentation software, email, and internet browser applications.
02.0 Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components.
03.0 Install, configure and troubleshoot system and device driver software and implement basic security measures.
04.0 Describe the origin, structure, and history of the Internet.
05.0 Install, configure, use, manage, and troubleshoot microcomputer operating systems.
06.0 Create and maintain database objects, store, retrieve and manipulate data stored in a relational database.
07.0 Demonstrate knowledge of networking technologies, networking hardware, and data communication concepts, protocols, and routing methods.
08.0 Install, configure, manage, deploy, monitor and troubleshoot Windows applications in a networked Windows environment.
09.0 Demonstrate knowledge of Project Management.
10.0 Perform customer service skills.

In addition, students will complete the competencies in one of the following specializations:

Information Technology Support Specialization Standards

11.0 Demonstrate proficiency in supporting Windows-based client and network computer systems.
12.0 Demonstrate proficiency in installing, configuring, deploying, and supporting desktop applications.
13.0 Demonstrate proficiency in supporting Windows users.
14.0 Perform help desk support activities.

Information Technology Analysis Specialization Standards

11.0 Perform computer information systems monitoring activities.
12.0 Perform computer information systems analysis activities.

Florida Department of Education
Student Performance Standards

Program Title: **Computer Information Technology**
CIP Number: **1511010305**
Program Length: **60 credit hours**
SOC Code(s): **11-3021**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate how to use current productivity software applications including word processing, spreadsheets, database, presentation software, email, and internet browser applications. – The student will be able to:
01.01	Describe the common user interfaces of electronic devices.
01.02	Identify common types of computer application software and their uses.
01.03	Define and describe the components of a typical operating system interface.
01.04	Create, name, rename, copy, move, backup and delete files, folders and subfolders.
01.05	Create, save, edit and print a document file.
01.06	Format text, paragraphs, and documents.
01.07	Insert, and modify graphic objects, pictures and images.
01.08	Locate and identify the components of a spreadsheet.
01.09	Enter data on a spreadsheet and use formulas to perform calculations.
01.10	Use built-in arithmetic, statistical, and logic functions on tabular data.
01.11	Format spreadsheets using various formatting techniques.
01.12	Create charts and graphs.
01.13	Select a design template and apply it to a presentation.
01.14	Add text, pictures, objects, and multimedia elements to a slide.
01.15	Insert, delete, copy, and move slides.
01.16	Format and edit a presentation using the outline view and the slides pane view.

	01.17	Present a slide show.
	01.18	Distinguish between appropriate and inappropriate use of technology in a professional or academic setting.
	01.19	Distinguish between legal and illegal file-sharing practices in a network and the Internet.
	01.20	Identify the ways in which a virus can infect electronic devices.
	01.21	Describe common threats to the security of electronic devices.
	01.22	Use a website address and a web-browser to navigate to a specific website.
	01.23	Use an Internet search engine to find a website on a specific topic.
	01.24	Save a URL as a “favorite” or “bookmark”.
	01.25	Create, send, and forward an email message with a file attachment to individuals and to multiple recipients.
02.0	Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components. – The student will be able to:	
	02.01	Describe the architecture and operation of a typical computer system.
	02.02	Describe the use of binary numbers to represent instructions and data and the hardware implications.
	02.03	Identify various coding schemes including ASCII and other data types.
	02.04	Describe and identify motherboards and their components.
	02.05	Describe the features and types of computer form factors, chassis, power supplies and cooling devices.
	02.06	Describe and identify mass storage devices.
	02.07	Distinguish between the different display devices and their characteristics.
	02.08	Summarize the function and types of adapter and interface cards.
	02.09	Construct and configure a computer system from individual components.
	02.10	Perform file and system management tasks, system imaging, data backup, and use command-line utilities to manage and maintain a computer, its partitions, directories, and files.
	02.11	Install system updates, device drivers, anti-virus and anti-spyware software, and other management and monitoring software to the operating system.
	02.12	Perform the installation, configuration, optimization, maintenance, and upgrading of printers and other peripheral devices.
	02.13	Troubleshoot new and existing computers and peripheral devices, and document the problems discovered and the solutions implemented.

	02.14	Troubleshoot client-side network connectivity issues using appropriate tools.
	02.15	Identify potential hazards and implement proper safety procedures, including electrostatic discharge (ESD) precautions and professional operational procedures, safe work environment and equipment handling.
03.0	Install, configure and troubleshoot system and device driver software and implement basic security measures. – The student will be able to:	
	03.01	Describe the various types of device drivers used by operating systems and the utilities used to install, configure, manage, upgrade and troubleshoot system devices.
	03.02	Describe the device and driver installation process.
	03.03	Identify, install, configure, and troubleshoot device drivers.
	03.04	Verify digital signatures of device drivers.
	03.05	Configure driver policies.
	03.06	Describe the security tools and features in operating systems and how to access them to perform a security audit and update.
	03.07	Install, configure and monitor firewalls to block dangerous incoming and outgoing network traffic.
	03.08	Install, configure and monitor anti-virus software.
	03.09	Perform anti-virus and other security scanning activities to prevent the infiltration of spyware and other malicious software.
	03.10	Install, configure and monitor updates, and perform system audits.
	03.11	Install, configure, upgrade, monitor and optimize security measures and policies.
	03.12	Perform preventive maintenance and activity monitoring for computer and network security.
04.0	Demonstrate understanding of internet structure, organization and navigation and how to support internet access and applications. – The student will be able to:	
	04.01	Describe the origin, structure, and history of the Internet and the World Wide Web.
	04.02	Describe Internet organizations, such as the Internic, IETF, domains and Requests for Comments (RFCs).
	04.03	Define and compare web-based marketing techniques.
	04.04	Describe e-commerce.
	04.05	Differentiate among an intranet site, an extranet site, and an Internet site.
	04.06	Characterize the role of the Internet in today's society.
	04.07	Describe several major ethical issues related to Internet use.

04.08	Identify legal issues related to Internet use.
04.09	Identify how the Internet affects intellectual property rights.
04.10	Identify how the Internet affects personal security and privacy.
04.11	Describe the World Wide Web (WWW).
04.12	Demonstrate the use of transfer protocols.
04.13	Demonstrate the use of typical remote access mechanisms.
04.14	Describe components of a URL.
04.15	Use Internet tools and utilities effectively.
04.16	Install and configure an Internet browser.
04.17	Install and configure browser add-ons and plug-ins.
05.0	Install, configure, use, manage, and troubleshoot microcomputer operating system. – The student will be able to:
05.01	Identify the fundamental principles of operating systems.
05.02	Describe the general features and uses of current operating systems.
05.03	Compare and contrast features of popular operating systems.
05.04	Identify the names, locations, purposes, and contents of major operating system files.
05.05	Use command line functions and utilities to manage the operating system, including proper syntax and switches.
05.06	Create, view, and manage disks, directories and files, and change file attributes.
05.07	Identify the major operating system utilities, their purpose, location, and options.
05.08	Install major operating systems and bring the operating system to a basic operational level.
05.09	Perform operating system upgrades.
05.10	Create an emergency boot disk with utilities utilizing basic system boot sequences and boot methods.
05.11	Optimize the operating system and major operating system subsystems.
05.12	Distinguish and interpret the meaning of common error codes and startup messages from the boot sequence and identify steps to correct the problems.
05.13	Recognize when to use common diagnostic utilities and tools.

05.14	Select and use system utilities and tools to diagnose, troubleshoot and resolve operating system problems.
05.15	Detect and resolve common operational and usability problems.
05.16	Discuss the network protocols used by operating systems.
05.17	Explain how networking is supported by various operating systems.
05.18	Configure operating systems to connect to a local area network.
05.19	Establish Internet connectivity.
05.20	Configure operating systems to connect to and use Internet resources.
05.21	Troubleshoot and diagnose basic network and Internet connectivity problems.
06.0	Create and maintain database objects, store, retrieve and manipulate data stored in a relational database. – The student will be able to:
06.01	Define what a database is and describe the components and structures of relational databases.
06.02	Explain the fundamental concepts of database design.
06.03	Design a relational database with multiple tables.
06.04	Determine the appropriate field data type and field size for fields in a table.
06.05	Create and modify tables, queries, forms and reports.
06.06	Insert, update, and delete data and records.
06.07	Create basic table relationships and relate tables in a database.
06.08	Identify the data elements by which to relate tables.
06.09	Describe foreign keys and their use when relating tables.
06.10	Interpret an entity relationship diagram for modeling a database.
06.11	Describe the purpose of SQL statements.
06.12	Define, describe and implement a query.
06.13	Write and implement basic queries formatted for specific output.
06.14	Retrieve information from a database by using query and filter tools.
06.15	Describe the use of SELECT statements including the use of various JOIN, SUBQUERIES, and conditional expressions.

	06.16	Describe the advantages of using an index, and implement different types of indexes on tables.
	06.17	Perform basic database maintenance.
	06.18	Monitor and analyze database performance.
	06.19	Backup and restore a database.
07.0	Demonstrate knowledge of networking technologies, networking hardware, and data communication concepts, protocols, and routing methods. – The student will be able to:	
	07.01	Identify the advantages and disadvantages of networked and non-network environments.
	07.02	Describe current networked environments, such as peer-to-peer and client/server.
	07.03	Identify and discuss issues such as security, privacy and redundancy related to networked environments.
	07.04	Identify and discuss issues related to naming conventions for domains, hosts, users, email, and network devices.
	07.05	Differentiate between telecommunications and data communications.
	07.06	List and define the layers in the OSI and TCP/IP network protocol models.
	07.07	Identify and describe current relevant IEEE network standards.
	07.08	Describe and illustrate the typical logical and physical network topologies, and explain the advantages and disadvantages of each topology.
	07.09	Describe the major functions and implementation of LAN hardware protocols such as Ethernet, and identify the physical components currently in use.
	07.10	Describe the LAN software protocols in current use.
	07.11	Discuss the characteristics of IP addresses and MAC addresses, and mapping between protocol addressing schemes.
	07.12	Differentiate between hardware used to implement different network topologies, including bus, ring and star.
	07.13	Identify and describe the current cable technologies, including shielded and unshielded twisted-pair, coaxial, and fiber optic, and their features including bandwidth, performance, plenum characteristics, and interference rejection.
	07.14	Describe current wireless technologies including Wi-Fi, blue tooth, satellite, microwave, radio and infrared.
	07.15	Describe the advantages and disadvantages of wireless and cable technologies, and identify the environments best suited for each technology.
	07.16	Describe the functions and characteristics of network connectivity hardware, included hubs, repeaters, bridges, switches, access units, routers, and gateways.
	07.17	Describe the hardware needed to connect a local area network to a wide area network and the Internet.
	07.18	Compare and contrast major functions and features of current network operating systems, including directory and other services.

	07.19	Describe the major functions of network server hardware and software components.
	07.20	Install and configure a network server, including the installation of network hardware and software.
	07.21	Describe the major functions of network client hardware and software components.
	07.22	Install and configure network client software on multiple computer platforms with support for multiple network protocols.
	07.23	Describe the function of network storage devices and other peripherals, including NAS, SAN, RAID, tape backup, printers, telecommunications devices, scanners, copiers, imaging devices, and document center equipment.
	07.24	Install and configure storage devices and other peripherals with network access.
	07.25	Install, configure, update and troubleshoot network drivers for network hosts and peripherals.
	07.26	Configure and troubleshoot network protocol stacks.
	07.27	Describe the characteristics of the current wide area network technologies and determine the most suitable WAN technology for a given situation.
08.0	Install, configure, manage, deploy, monitor and troubleshoot Windows applications in a networked Windows environment. – The student will be able to:	
	08.01	Analyze the business environment and select a Windows deployment and licensing method.
	08.02	Describe the major steps and issues associated with Windows deployment and draft a Windows migration strategy.
	08.03	Describe, install and configure the Windows deployment tools.
	08.04	Perform data and user backup for migration to a new Windows environment.
	08.05	Prepare, install and test a Windows Reference System including Service Packs and updates, device drivers, and base utilities and applications for the creation of a Windows client image.
	08.06	Configure the Windows Reference System's settings to optimize performance, automate security and Windows updates, provide network access and administrative controls, and standardize Windows features to comply with business needs.
	08.07	Create, capture, test and manage the custom image of the Windows Reference System.
	08.08	Deploy the Windows Reference System to client computers in a networked environment.
	08.09	Migrate current applications and user data after deployment and verify and troubleshoot deployment issues.
	08.10	Configure, manage and troubleshoot Windows device drivers, network settings, peripheral devices and printers.
	08.11	Join the Windows client to a domain and configure group policies.
	08.12	Describe methods of establishing and controlling group policies.
	08.13	Create, modify and administer local and domain users and groups for a Windows client.

	08.14	Configure, manage and troubleshoot Windows client mobile features including configuring mobile devices, power management, disk encryption, wireless networking, VPN and remote access.
	08.15	Configure, manage and troubleshoot Windows client access to the network, network resources, and the Internet.
	08.16	Configure, manage and troubleshoot administrative settings including: group policies, user profiles, permissions, user account control, event viewing, forwarding and logging, task scheduler, performance monitoring, Windows updates, security settings, firewall features, and authentication.
	08.17	Analyze business needs and licensing requirements in the selection of enterprise applications for deployment in networked environment.
	08.18	Assess Windows hardware requirements and compatibility with existing applications and devices.
	08.19	Perform application performance and compatibility testing and troubleshooting prior to application software installation.
	08.20	Install and configure business application.
	08.21	Deploy single license applications on a client computer.
	08.22	Troubleshoot application software installation and compatibility issues.
	08.23	Describe the role of desktop support in a Windows domain environment.
	08.24	Perform management, testing, and troubleshoot activities.
	08.25	Document incidents and support activities.
	08.26	Perform post-installation tasks, compatibility and reliability testing, resolve performance issues, and perform a security audit.
	08.27	Utilize hardware and software installation tools to perform testing, maintenance and updates.
	08.28	Perform support functions for Windows clients, users and deployed applications, including end user support and training.
	08.29	Configure, manage and monitor administrative features and security settings.
	08.30	Document installed software, conduct license auditing, create a performance baseline, and draft a troubleshooting checklist.
09.0	Foundations of project management. – The student will be able to:	
	09.01	Describe the steps in planning and managing a project.
	09.02	Define an implementation schedule for a project.
	09.03	Participate in group discussions.
	09.04	Choose appropriate actions in situations that require effective time management.

09.05	Describe a project life cycle from initiation to planning through execution, acceptance, support, quality, budgeting, and closure.
09.06	Understand the factors contributing to risk management planning.
09.07	Understand the cultural, social, international, political and physical aspects of the project environment.
10.0	Perform customer service skills. – The student will be able to:
10.01	Identify and recognize user's state of mind and attitude.
10.02	Determine the customer needs using system analysis strategies.
10.03	Listen to the customer and ask appropriate questions.
10.04	Maintain a professional demeanor when dealing with difficult customers.
10.05	Provide suggested solutions using knowledge base.
10.06	Project professional appearance and demeanor.
10.07	Promote company services, products, and policies when appropriate.
10.08	Use tact when dealing with customers and competitors.
10.09	Maintain professional work ethics and follow policies and procedures.
10.10	Respect customer work space/environment.
10.11	Relate all information to customer in a manner that the customer can understand.
10.12	Set realistic expectations when establishing deadlines for customer solutions.
10.13	Communicate action plan including timelines.
10.14	Recognize the existence of internal/external customers and follow appropriate guidelines for each.

Information Technology Support Specialization Standards	
11.0	Demonstrate proficiency in supporting Windows-based client and network computer systems. – The student will be able to:
11.01	Describe the features and characteristics of a well-deployed and operational client computer in a Windows networked environment.
11.02	Perform baseline measurements, perform security and performance audits on a client computer, and document findings.
11.03	Describe the methods of establishing, configuring and controlling group policies.
11.04	Configure and troubleshoot group policy settings for client computers in a Windows domain.
11.05	Configure, manage and troubleshoot task scheduler, event forwarding and monitoring tools on a Windows client computer.
11.06	Test, configure and schedule Windows updates, patches and service packs prior to and after network-wide deployment.
11.07	Troubleshoot Windows performance, reliability, and security issues.
11.08	Configure, manage, maintain and troubleshoot Windows security issues, including adding trusted sites, installing secure plug-ins, identifying group policy restrictions, obtaining certificates, analyzing services and programs.
11.09	Install, manage and maintain anti-malicious software, firewalls and access control.
11.10	Configure, troubleshoot and secure network protocols and services for Windows client computers.
11.11	Configure, enable, manage and troubleshoot VPN, mobile and remote access.
11.12	Troubleshoot, resolve and document network issues, including wired and wireless connectivity, name resolution issues conflicts IP address, routing problems, security breaches, domain issues and group policy problems.
11.13	Determine whether problems are a result of hardware issues, Windows issues, application failures, user errors or other reasons.
11.14	Monitor events in an enterprise network and log incidents.
12.0	Demonstrate proficiency in installing, configuring, deploying, and supporting desktop applications. – The student will be able to:
12.01	Perform advanced office application functions using word processing, spreadsheet, database, presentation, email, and web applications.
12.02	Test functionality and compatibility of desktop applications and updates with Windows operating system and the intended enterprise use.
12.03	Demonstrate the common steps to install desktop applications.
12.04	Configure and deploy desktop and enterprise applications in a networked environment.
12.05	Administer software license policies, including management of licenses and licensing restrictions, digital signing, and auditing.
12.06	Perform support functions for deployed applications.

12.07	Troubleshoot and resolve desktop application issues in a networked environment.
12.08	Describe how product standards in the IT field emerged.
12.09	Identify methods for evaluation and selection of products.
13.0	Demonstrate proficiency in supporting Windows users. – The student will be able to:
13.01	Configure the Windows interface and customize application features to meet user needs and to comply with ADA.
13.02	Configure and modify default user settings in Windows and application to maximize user performance and to comply with business policies.
13.03	Manage, maintain and backup Windows client computers according to business procedures and user needs without adversely affecting workplace activities.
13.04	Migrate user data, settings and profile to a newly deployed and configured Windows computer.
13.05	Configure, maintain and troubleshoot user account control and authentication issues, including resetting passwords, recovering encryption keys, modifying user accounts and group policies, and elevating privileges.
13.06	Determine whether a client is receiving regularly scheduled updates and resolve issues.
13.07	Configure and troubleshoot user access to network resources.
13.08	Perform a system recovery on a user computer and backup user data.
13.09	Describe methods of understanding and managing user's needs and expectations.
14.0	Perform help desk support activities. – The student will be able to:
14.01	Describe the various functions, operations, and departments within a business organization such as accounting, payroll, human resources and marketing.
14.02	Describe the role of the IT support function within the business organization.
14.03	Describe the incident management process and help desk service best practices when handling incidents.
14.04	Apply systematic problem-solving and troubleshooting processes to typical end-user issues.
14.05	Discuss the processes for resolving customer issues.
14.06	Describe strategies for handling difficult clients and incidents.
14.07	Identify and select a variety of tools and technologies that aid in the effective management of the help desk function.
14.08	Describe the process of identifying and resolving customer needs within the context of the business enterprise.
14.09	Describe the training process of end users and effective methods of delivering training materials.

14.10	Present and follow oral and written instructions.
14.11	Participate in group discussions as an IT support specialist and trainer.
14.12	Describe the types of end user documentation and the process of developing technical instructions for end users.
14.13	Prepare, outline, and deliver a short IT training presentation.
14.14	Use appropriate communication skills, courtesy, manners, and dress in the workplace.

Information Technology Analysis Specialization Standards	
11.0	Perform systems monitoring activities. – The student will be able to:
11.01	Create and review back up logs.
11.02	Create and review server logs.
11.03	Create and review application logs.
11.04	Create and review resolution logs.
11.05	Create and review security logs.
11.06	Prepare a schedule to verify applications status.
11.07	Prepare a schedule to verify backup status.
11.08	Prepare a schedule to verify server status.
11.09	Track network performance as compared to an established baseline.
11.10	Identify problem trends and create resolution plans.
11.11	Document statistical analysis and monitoring activities.
12.0	Perform computer information systems analysis activities. – The student will be able to:
12.01	Prepare appropriate systems and analysis charts and other visual aids.
12.02	Describe the major steps in the systems development cycle.
12.03	Perform basic business related tasks using the most appropriate software applications.
12.04	Identify situations where software packages and/or custom developed packages need to be integrated with each other.
12.05	Identify situations where software packages and/or hardware need to be integrated with software/hardware available on other types of computers.
12.06	Select appropriate hardware devices to accomplish assigned tasks.
12.07	Identify appropriate vendor sources for software, hardware and auxiliary supplies.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a “transfer value” assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following PSAV programs have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

PC Support Services (B070400) – 9 credits

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

CompTIA A+ (COMPT001) – 3 credits
CompTIA Server+ (COMPT009) – 3 credits
MCIT Certified IT Professional – Consumer Support Technician (MICRO027) – 3 credits

MCIT Professional - Enterprise Support Technician (MICRO033) – 3 credits
Microsoft Certified Desktop Support Technician (MICRO006) – 3 credits
Microsoft Certified Technology Specialist - Distributed Applications (MICRO047) – 3 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp .

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Help Desk Support Technician (0511010313) – 16/18 credit hours
Information Technology Support Specialist (0511010311) – 18/28 credit hours
Information Technology Analysis (0511010312) – 27/28 credit hours
Geographic Information System CCC (0545070213) – 21 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Database Technology**
Career Cluster: **Information Technology**

NOTE: This program has been daggered for deletion with 2016-2017 being the last cohort of students permitted to enroll in the program. After 2016-2017, no new students may be enrolled in this program. Students already enrolled in the program may, at the college's discretion, continue taking courses in the program until completion. Database Technology 60 1511010308 will replace this program.

AS	
CIP Number	1511010306
Program Type	College Credit
Standard Length	63 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as Database Administrators and Developers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

This program focuses on specific, transferable skills and stresses understanding and demonstration of the following elements of the database management and development industry: database creation, database management, database tuning, database software development, and database recovery.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 63 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of fundamental database concepts.
02.0 Demonstrate conceptual design principles.
03.0 Demonstrate the ability to create a database design.
04.0 Demonstrate an understanding of basic Data Definition Language and Data Manipulation Language SQL (Structured Query Language) syntax to create relational tables.
05.0 Demonstrate the ability to create, maintain, and delete sequences, indexes and synonyms and other schema objects.
06.0 Demonstrate the ability to query the database and optimize information retrieval.

In addition, students will complete the standards in one of the following specializations:

Microsoft Certified Database Administrator Specialization Standards

07.0 Demonstrate how to design and implement a data warehouse.
08.0 Demonstrate how to extract and transform data.
09.0 Demonstrate how to load data.
10.0 Demonstrate how to configure and deploy SSIS solutions.

Oracle Certified Database Administrator Specialization Standards

11.0 Demonstrate an understanding of the Oracle architectural components.
12.0 Demonstrate how to create an Oracle database instance.
13.0 Demonstrate how to manage an instance of the database.
14.0 Demonstrate how to maintain Redo log files, and how to use the data dictionary views.
15.0 Demonstrate how to manage tablespaces and datafiles.
16.0 Demonstrate an understanding of the Oracle storage structures.
17.0 Demonstrate the ability to query a database.
18.0 Demonstrate how to manage constraints and indexes.
19.0 Demonstrate a basic understanding of the Oracle Recovery Manager tool for performing backup and recovery operations.
20.0 Demonstrate the ability to perform backups.
21.0 Demonstrate the ability to perform recovery procedures.
22.0 Demonstrate how to configure and use a Flashback Database.
23.0 Demonstrate the different methods that are used to recover from user errors.
24.0 Demonstrate an understanding of how to detect and resolve block corruptions.
25.0 Demonstrate an understanding of the goals and processes of performance tuning.
26.0 Demonstrate capability to use the Oracle Database Resource Manager (DRM) to manage database and operating system performance.
27.0 Demonstrate how to automate management tasks, create scheduled jobs, programs, and schedules.
28.0 Demonstrate the ability to efficiently manage space-related inefficiencies of the database.
29.0 Demonstrate the ability to understand the issues with memory management and shall demonstrate how to configure memory manually.

30.0 Demonstrate the ability to set up an Oracle database to be deployed globally.
31.0 Demonstrate the ability to use Oracle diagnostic tools and the Oracle listener.

Oracle Certified Database Developer Specialization Standards

32.0 Demonstrate the use of general PL/SQL programming language fundamental constructs.
33.0 Demonstrate the use of DML simple selection statements in a PL/SQL block.
34.0 Demonstrate the use of conditional control IF and CASE statements.
35.0 Demonstrate the use of employing iterative control loops for iterating through a set of instructions.
36.0 Demonstrate the use of incorporating exception handling methods.
37.0 Demonstrate how to manipulate cursors and use parameters with cursors and complex nested cursors.
38.0 Demonstrate how to design and implement functions and procedures.
39.0 Demonstrate how to design and implement packages and triggers.
40.0 Demonstrate the use of collections to store and manipulate data.
41.0 Demonstrate how to manipulate large objects, such as LOB and BFILEs.
42.0 Demonstrate how to tune PL/SQL code and improve performance with caching.

Florida Department of Education
Student Performance Standards

Program Title: **Database Technology**
CIP Number: **1511010306**
Program Length: **63 credit hours**
SOC Code(s): **15-1141**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of fundamental database concepts. The student will be able to:
01.01	Define data.
01.02	Define information.
01.03	Describe the process by which information is derived from data.
01.04	Describe how a database is implemented.
01.05	Distinguish between variant database models, how they differ, and the advantages to each model.
01.06	Describe the advantages (i.e., improved data consistency, quality, integrity) and disadvantages of using databases (i.e., cost and complexity).
01.07	Conducting online research to locate and identify the different database engines, models, and providers.
01.08	Define and providing examples of a database transaction.
02.0	Demonstrate conceptual design principles. The student will be able to:
02.01	Perform a use case analysis and determining the functional requirements from use case.
02.02	Identify non-functional requirements that will affect a solution's design.
02.03	Analyze data requirements to determine data entities and attributes.
02.04	Analyze entities and attributes to determine their relationships.
02.05	Develop a conceptual model that captures the data flow and integrity constraints by using various components including:
02.05.1	base entity type.
02.05.2	bridging entity types.

	02.05.3 composite attribute.
	02.05.4 multivalued attribute.
	02.05.5 derived attribute.
	02.05.6 associative entity type.
	02.05.7 relationships between entity types.
	02.05.8 minimum and maximum cardinality constraints.
	02.05.9 deletion rules.
03.0	Demonstrate the ability to create a database design. The student will be able to:
	03.01 Describe all data types (e.g., CHAR, NUMBER).
	03.02 Discuss the basic tenets of proper database design by describing the impact of:
	03.02.1 Data duplication.
	03.02.2 Data redundancy.
	03.02.3 Data integrity.
	03.02.4 Implicit information storage.
	03.02.5 Referential integrity.
	03.03 Derive candidate keys by decomposition and synthesis.
	03.04 Describe and executing the general methods of design using 3NF (third-normal form) to eliminate redundancy, partial and transitive dependencies.
	03.05 Identify the primary key foreign key relationships between the entity types.
04.0	Demonstrate an understanding of basic Data Definition Language and Data Manipulation Language SQL (Structured Query Language) syntax to create relational tables. The student will be able to:
	04.01 Describe the basic characteristics of the Standard Query Language.
	04.02 Write SQL statements to create simple tables.
	04.03 Create data integrity controls.
	04.04 Change/update table definitions.
	04.05 Insert, update, and delete data/records.

	04.06 Describe referential integrity and how it is enforced.
	04.07 Describe the advantages of using an index, and implementing different types of indexes on tables.
	04.08 Describe how a database implements and uses indexing (i.e., B-Tree, Bitmap).
	04.09 Verify the existence of an index using the data dictionary.
	04.10 Describe foreign keys and their use when relating tables.
	04.11 Define the purpose of a sequence and how it can be used in a database.
	04.12 Create and removing a sequence.
05.0	Demonstrate the ability to create, maintain, and delete sequences, indexes and synonyms and other schema objects. The student will be able to:
	05.01 Define the purpose of a sequence and how it can be used in a database.
	05.02 Create and removing a sequence.
	05.03 Create indexes and removing indexes.
	05.04 Verify the existence of an index using the data dictionary.
06.0	Demonstrate the ability to query the database and optimize information retrieval. The student will be able to:
	06.01 Identify the data elements by which to relate tables.
	06.02 Retrieve row and column data from tables executing simple SELECT statements.
	06.03 Identify keywords, mandatory clauses, and optional clauses in a SELECT statement.
	06.04 Use character, number, and date functions in SELECT statements.
	06.05 Create a search condition using mathematical comparison operators.
	06.06 Use the WHERE clause to restrict the rows returned by a query.
	06.07 Sort rows that are retrieved by a query, and use ampersand substitution to restrict and sort output at runtime.
	06.08 Write SELECT statements to access data from more than one table using equijoins and non-equijoins.
	06.09 Join a table to itself using a self-join.
	06.10 View data that does not meet a join condition by using outer joins.
	06.11 Generate a Cartesian product of all rows from two or more tables.

06.12	Identify the available group functions (GROUP BY, HAVING, INTERSECT).
06.13	Describe the use of the group functions.
06.14	Group data by using the GROUP BY clause.
06.15	Include or exclude grouped rows by using the HAVING clause.
06.16	Write complex SELECT statements including the use of various JOIN, SUBQUERIES, and conditional expressions.
06.17	Discuss when it is appropriate to use a subquery, and describing the types of problems that subqueries can solve.
06.18	Identify which clauses can contain subqueries.
06.19	Write single-row and multiple-row subqueries.
06.20	Nest a subquery inside another subquery.

Microsoft Certified Database Administrator Specialization Standards	
07.0	Demonstrate how to design and implement a data warehouse. The student will be able to:
	07.01 Design and implement dimensions.
	07.02 Design and implement fact tables.
08.0	Demonstrate how to extract and transform data. The student will be able to:
	08.01 Define connection managers.
	08.02 Design data flow.
	08.03 Implement data flow.
	08.04 Manage SSIS package execution.
	08.05 Implement script tasks in SSIS.
09.0	Demonstrate how to load data. The student will be able to:
	09.01 Design control flow.
	09.02 Implement package logic by using SSIS variables and parameters.
	09.03 Implement control flow.
	09.04 Implement data load options.
	09.05 Implement script components in SSIS.
10.0	Demonstrate how to configure and deploy SSIS solutions. The student will be able to:
	10.01 Troubleshoot data integration issues.
	10.02 Install and maintain SSIS components.
	10.03 Implement auditing, logging, and event handling.
	10.04 Deploy SSIS solutions.

Oracle Certified Database Administrator Specialization Standards	
11.0	Demonstrate an understanding of the Oracle architectural components. The student will be able to:
	11.01 Define an Oracle Database, the Oracle server, and the Oracle Instance, and Oracle database memory architecture.
	11.02 Explain the differences between Oracle 10g client and server installation.
	11.03 Use the Oracle Universal Installer to install Oracle on a host machine.
	11.04 Establish a connection and creating a session to the database instance.
	11.05 Explain the physical structure, memory structure, and process structure of the Oracle database.
12.0	Demonstrate how to create an Oracle database instance. The student will be able to:
	12.01 Explain the steps needed to create a database.
	12.02 Identify the database administrative tools.
	12.03 Configure the initial settings for creating the database.
	12.04 Create, start, and stop a database instance.
	12.05 Explain the basic steps in managing the configuration parameter files, and using Net Manager to configure Oracle Net Services.
13.0	Demonstrate how to manage an instance of the database. The student will be able to:
	13.01 Create, manage, and use the initialization files: PFILE and SPFILE.
	13.02 Identify the various states of starting an instance.
	13.03 Identify the various options available to shutdown an instance.
	13.04 Monitor the Alert and Trace files.
14.0	Demonstrate how to maintain Redo log files, and how to use the data dictionary views. The student will be able to:
	14.01 Explain how the control file, data files, redo log files, and archive files are linked and work together.
	14.02 Explain the uses of the control file.
	14.03 List the contents of the control file.
	14.04 Maintain and manage the online redo log files.
	14.05 Obtain and archive online redo log file information.

	14.06 Use the Oracle Managed Files (OMF) to create, manage, and obtain information from the control files.
	14.07 Identify the use and contents of the data dictionary.
	14.08 Use the data dictionary to retrieve information about the database.
15.0	Demonstrate how to manage tablespaces and datafiles. The student will be able to:
	15.01 Describe the storage hierarchy.
	15.02 Differentiate between the logical and physical structures.
	15.03 Create many types of tablespaces.
	15.04 Configure and viewing storage for tablespaces and datafiles.
	15.05 Use and managing undo data.
	15.06 Describe and configuring diagnostic (trace) files.
16.0	Demonstrate an understanding of the Oracle storage structures. The student will be able to:
	16.01 Describe and differentiating between the logical and physical structure of the database (segments, extents, blocks).
	16.02 List the segment types and their uses.
	16.03 Maintain storage structures with automatic segment – space management.
	16.04 Maintain storage structures manually.
	16.05 Obtain storage structure information.
17.0	Demonstrate the ability to query a database. The student will be able to:
	17.01 Write basic SQL single row, datatype conversion, group, and user-defined functions.
	17.02 Write filtered, sorted, and aggregated queries.
	17.03 Write SQL statements using advanced queries involving joins, subqueries, and other specialized queries.
18.0	Demonstrate how to manage constraints and indexes. The student will be able to:
	18.01 List the different types of indexes, their uses, and constraints.
	18.02 Develop an example of each type of index.
	18.03 Create index-organized tables.

	18.04 Create, modify, and drop constraints.
	18.05 Maintain indexes.
	18.06 Identify unused indexes.
19.0	Demonstrate a basic understanding of the Oracle Recovery Manager tool for performing backup and recovery operations. The student will be able to:
	19.01 Explain the different backup options available to the database administrator.
	19.02 Describe the Recovery Manager architecture.
	19.03 Start RMAN to connect to the database.
	19.04 Describe the different settings used to configure the persistent RMAN parameters.
20.0	Demonstrate the ability to perform backups. The student will be able to:
	20.01 Explain the purpose of the Flash Recovery area.
	20.02 Describe the various types of backups.
	20.03 Perform block-level backups.
	20.04 Implement the commands for performing backups at various levels.
	20.05 Demonstrate the use of the RUN command.
	20.06 Set Duration and Throttling.
	20.07 Explain the Block Tracking feature.
	20.08 Use RMAN commands to display information about backups.
21.0	Demonstrate the ability to perform recovery procedures. The student will be able to:
	21.01 Identify the different types of failures that occur in the database.
	21.02 Perform a complete recovery on a database.
	21.03 Perform an incomplete recovery on a database.
	21.04 Demonstrate how to perform a recovery of non-critical files.
22.0	Demonstrate how to configure and use a Flashback Database. The student will be able to:
	22.01 Explain the Flashback Database feature.
	22.02 Describe the components of Flashback Database.

	22.03 Explain the guidelines and restrictions of Flashback Database.
	22.04 Configure, maintain, and monitor Flashback Database.
	22.05 Perform Flashback Database using SQL, RMAN, and Enterprise Manager.
	22.06 Resolve errors that may occur during the Flashback Database creation operation.
23.0	Demonstrate the different methods that are used to recover from user errors. The student will be able to:
	23.01 Describe the Flashback Technology features available in Oracle.
	23.02 Explain the configuration and implementation of the Flashback Drop operation.
	23.03 Manage the recycle bin.
	23.04 Explain the configuration and implementation of the Flashback Query operation.
	23.05 Recover from user errors using the Flashback Versions Query operation.
	23.06 Perform transaction level recovery using Flashback Transaction Query operation.
	23.07 Explain the configuration and implementation of the Flashback Table.
24.0	Demonstrate an understanding of how to detect and resolve block corruptions. The student will be able to:
	24.01 Describe what block corruption is.
	24.02 Identify instances of block corruptions.
	24.03 Resolve block corruptions.
	24.04 Use the ANALYZE command to check the integrity of a schema object (i.e., tables and indexes).
	24.05 Describe the use of the DBVERIFY utility.
	24.06 Utilize the DB_BLOCK_CHECKING parameter.
	24.07 Execute the DBMS_REPAIR package.
	24.08 Perform Block Media recovery using RMAN.
25.0	Demonstrate an understanding of the goals and processes of performance tuning. The student will be able to:
	25.01 Describe the job roles in performance tuning.
	25.02 List the steps in the tuning phases.

	25.03 Explain tuning goals and service level agreements.
	25.04 Describe common performance problems.
	25.05 Explain the tuning methodology.
26.0	Demonstrate how to use the Oracle Database Resource Manager (DRM) to manage database and operating system performance. The student will be able to:
	26.01 Explain the purpose of the Data Resource Manager.
	26.02 Describe each of the components of the DRM.
	26.03 Create consumer groups.
	26.04 Create resource plans.
	26.05 Create resource plan directives.
	26.06 Use the DRM to automatically map user sessions with consumer groups.
	26.07 Obtain information about database performance using the DRM.
27.0	Demonstrate how to automate management tasks, create scheduled jobs, programs, and schedules. The student will be able to:
	27.01 Use the Oracle Scheduler to create jobs, programs, and schedule tasks.
	27.02 Reuse the Scheduler to view information about job executions and job instances.
	27.03 Use the Scheduler to perform automatic gathering of optimizer statistics.
	27.04 Use the Scheduler to automatically gather object statistics to make efficient decisions about execution plans.
28.0	Demonstrate the ability to efficiently manage space-related inefficiencies of the database. The student will be able to:
	28.01 Tune redo writing and archiving operations.
	28.02 Set and modifying thresholds for space usage.
	28.03 Manage tablespace usage to reduce space-related error conditions.
	28.04 Use different storage options to improve the performance of queries.
	28.05 Manage Resumable Space Allocation using the DBMS_RESUMABLE package.
29.0	Demonstrate the ability to understand the issues with memory management and shall demonstrate how to configure memory manually. The student will be able to:
	29.01 Explain the memory structures in the Oracle instance and their function.
	29.02 Manually configure memory structures of the System Global Area (SGA).

	29.03 Implement Automatic Shared Memory Management.
	29.04 Configure the SGA parameters for various memory components in the SGA manually.
	29.05 Configure memory structures of the Program Global Area manually.
30.0	Demonstrate the ability to set up an Oracle database to be deployed globally. The student will be able to:
	30.01 Customize language-dependent behavior for the database and individual sessions.
	30.02 Specify different linguistic sorts for queries.
	30.03 Use date-time data types for different time zones.
	30.04 Query data using case-sensitive and accent-insensitive searches.
	30.05 Obtain globalization support configuration information.
31.0	Demonstrate the ability to use Oracle diagnostic tools and the Oracle listener. The student will be able to:
	31.01 Describe the purpose and use of the diagnostic tools that are available within the database.
	31.02 Describe the vulnerabilities of the listener and the different methods that can be used to secure it.

Oracle Certified Database Developer Specialization Standards	
32.0	Demonstrate the use of general PL/SQL programming language fundamental constructs. The student will be able to:
32.01	Employ PL/SQL language components including variables and identifiers.
32.02	Make use of anchored data types.
32.03	Explain the use of a block, nested block, and labels.
33.0	Demonstrate the use of DML simple selection statements in a PL/SQL block. The student will be able to:
33.01	Use the SELECT INTO syntax for variable initialization.
33.02	Use Data Manipulation Language statement sin a PL/SQL block.
33.03	Make use of a sequence in a PL/SQL block.
33.04	Make use of the COMMIT, ROLLBACK, and SAVEPOINT commands in a PL/SQL block.
34.0	Demonstrate the use of conditional control IF and CASE statement. The student will be able to:
34.01	Use the IF-THEN, and IF-THEN-ELSE control statements.
34.02	Use nested IF statements.
34.03	Use the CASE statement in a procedural block of code.
34.04	Use a CASE expression.
35.0	Demonstrate the use of employing iterative control loops for iterating through a set of instructions. The student will be able to:
35.01	Use simple loops with EXIT conditions.
35.02	Use simple loops with EXIT WHEN conditions.
35.03	Use WHILE loops.
35.04	Use numeric FOR loops with the IN and REVERSE option.
36.0	Demonstrate the use of incorporating exception handling methods. The student will be able to:
36.01	Explain the use of error handling methods.
36.02	Use built-in exception handling mechanisms.
36.03	Create user-defined exceptions.

37.0	Demonstrate how to manipulate cursors and use parameters with cursors and complex nested cursors. The student will be able to:
	37.01 Utilize cursor attributes to control the memory where statements are executed.
	37.02 Process an explicit cursor.
	37.03 Use cursors to fetch rows.
	37.04 Use cursors for loops.
	37.05 Use parameters in a cursor.
	37.06 Use complex nested cursors.
	37.07 Use FOR UPDATE and WHERE CURRENT clause in a cursor.
38.0	Demonstrate how to design and implement functions and procedures. The student will be able to:
	38.01 Create procedures.
	38.02 Query the data dictionary for information on procedures.
	38.03 Use IN and OUT parameters with procedures.
	38.04 Create stored functions.
	38.05 Invoke functions with SQL statements.
39.0	Demonstrate how to design and implement packages and triggers. The student will be able to:
	39.01 Create package specifications.
	39.02 Create package bodies, package variables and cursors.
	39.03 Call stored packages.
	39.04 Write triggers in response to DML, DDL, system and user generated events.
40.0	Demonstrate the use of collections to store and manipulate data. The student will be able to:
	40.01 Use associative arrays.
	40.02 Use nested tables.
	40.03 Create table-based and cursor-based records.
	40.04 Create and use user-defined records.

41.0	Demonstrate how to manipulate large objects, such as LOB and BFILEs. The student will be able to:
	41.01 Describe a LOB object.
	41.02 Use BFILEs.
	41.03 Use DBMS_LOB.READ and DBMS_LOB.WRITE to manipulate LOBs.
	41.04 Create a temporary LOB programmatically with the DBMS_LOB package.
	41.05 Use SecureFile LOBs to store documents.
	41.06 Convert BasicFile LOBs to SecureFile LOB format.
	41.07 Enable reduplication and compression.
42.0	Demonstrate how to tune PL/SQL code and improve performance with caching. The student will be able to:
	42.01 Describe result caching.
	42.02 Use SQL query result cache.
	42.03 Use PL/SQL function cache.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

Oracle Certified Associate (ORACL001) – 6 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp .

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 60 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Microsoft Certified Database Administrator (0511020309) – 15 credit hours
Oracle Certified Database Administrator (0511020307) – 15 credit hours
Oracle Certified Database Developer (0511020308) – 15 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Computer Information Technology (60)**
Career Cluster: **Information Technology**

AS	
CIP Number	1511010307
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1121 – Computer Systems Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a PC Support Technician, help desk technician, user support analyst, applications system analyst, information systems specialist, technical support analyst, computer information manager, user support supervisor, computer systems analyst, customer service representative, computer operator, computer repair technicians, computer sales person, help desk office supervisor, office systems support specialist, software tester, software trainer, user support specialist information security specialist in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to analyze microcomputer oriented operating procedures, software applications packages, and hardware in order to devise efficient methods to manage a microcomputer-based work environment; develop new systems to meet projected needs; select and install information technology equipment, troubleshoot information technology equipment, manage and support information technology users.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two specializations with one common core. It is recommended that students complete the core or demonstrate a mastery of the student performance standards contained in the core before advancing to the course(s) in the next level of specialization. The common core consists of technical core skills from the following areas: computer maintenance and support, networking fundamentals, operating systems, web page authoring, database applications and fundamentals of project management. The total Associate in Science degree program(s) consists of 60 credit hours.

Specialization	SOC Codes	Page
Information Technology Support	15-1151	12
Information Technology Analysis	15-1121	15

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate how to use current productivity software applications including word processing, spreadsheets, database, presentation software, email, and internet browser applications.
02.0 Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components.
03.0 Install, configure and troubleshoot system and device driver software and implement basic security measures.
04.0 Describe the origin, structure, and history of the Internet.
05.0 Install, configure, use, manage, and troubleshoot microcomputer operating systems.
06.0 Create and maintain database objects, store, retrieve and manipulate data stored in a relational database.
07.0 Demonstrate knowledge of networking technologies, networking hardware, and data communication concepts, protocols, and routing methods.
08.0 Install, configure, manage, deploy, monitor and troubleshoot Windows applications in a networked Windows environment.
09.0 Demonstrate knowledge of Project Management.
10.0 Perform customer service skills.

In addition, students will complete the competencies in one of the following specializations:

Information Technology Support Specialization Standards

11.0 Demonstrate proficiency in supporting Windows-based client and network computer systems.
12.0 Demonstrate proficiency in installing, configuring, deploying, and supporting desktop applications.
13.0 Demonstrate proficiency in supporting Windows users.
14.0 Perform help desk support activities.

Information Technology Analysis Specialization Standards

11.0 Perform computer information systems monitoring activities.
12.0 Perform computer information systems analysis activities.

Florida Department of Education
Student Performance Standards

Program Title: **Computer Information Technology**
CIP Number: **1511010305**
Program Length: **60 credit hours**
SOC Code(s): **11-3021**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate how to use current productivity software applications including word processing, spreadsheets, database, presentation software, email, and internet browser applications. – The student will be able to:
01.01	Describe the common user interfaces of electronic devices.
01.02	Identify common types of computer application software and their uses.
01.03	Define and describe the components of a typical operating system interface.
01.04	Create, name, rename, copy, move, backup and delete files, folders and subfolders.
01.05	Create, save, edit and print a document file.
01.06	Format text, paragraphs, and documents.
01.07	Insert, and modify graphic objects, pictures and images.
01.08	Locate and identify the components of a spreadsheet.
01.09	Enter data on a spreadsheet and use formulas to perform calculations.
01.10	Use built-in arithmetic, statistical, and logic functions on tabular data.
01.11	Format spreadsheets using various formatting techniques.
01.12	Create charts and graphs.
01.13	Select a design template and apply it to a presentation.
01.14	Add text, pictures, objects, and multimedia elements to a slide.
01.15	Insert, delete, copy, and move slides.
01.16	Format and edit a presentation using the outline view and the slides pane view.

	01.17	Present a slide show.
	01.18	Distinguish between appropriate and inappropriate use of technology in a professional or academic setting.
	01.19	Distinguish between legal and illegal file-sharing practices in a network and the Internet.
	01.20	Identify the ways in which a virus can infect electronic devices.
	01.21	Describe common threats to the security of electronic devices.
	01.22	Use a website address and a web-browser to navigate to a specific website.
	01.23	Use an Internet search engine to find a website on a specific topic.
	01.24	Save a URL as a “favorite” or “bookmark”.
	01.25	Create, send, and forward an email message with a file attachment to individuals and to multiple recipients.
02.0	Install, configure, upgrade and troubleshoot computer hardware and associated peripheral devices and other system components. – The student will be able to:	
	02.01	Describe the architecture and operation of a typical computer system.
	02.02	Describe the use of binary numbers to represent instructions and data and the hardware implications.
	02.03	Identify various coding schemes including ASCII and other data types.
	02.04	Describe and identify motherboards and their components.
	02.05	Describe the features and types of computer form factors, chassis, power supplies and cooling devices.
	02.06	Describe and identify mass storage devices.
	02.07	Distinguish between the different display devices and their characteristics.
	02.08	Summarize the function and types of adapter and interface cards.
	02.09	Construct and configure a computer system from individual components.
	02.10	Perform file and system management tasks, system imaging, data backup, and use command-line utilities to manage and maintain a computer, its partitions, directories, and files.
	02.11	Install system updates, device drivers, anti-virus and anti-spyware software, and other management and monitoring software to the operating system.
	02.12	Perform the installation, configuration, optimization, maintenance, and upgrading of printers and other peripheral devices.
	02.13	Troubleshoot new and existing computers and peripheral devices, and document the problems discovered and the solutions implemented.

	02.14	Troubleshoot client-side network connectivity issues using appropriate tools.
	02.15	Identify potential hazards and implement proper safety procedures, including electrostatic discharge (ESD) precautions and professional operational procedures, safe work environment and equipment handling.
03.0	Install, configure and troubleshoot system and device driver software and implement basic security measures. – The student will be able to:	
	03.01	Describe the various types of device drivers used by operating systems and the utilities used to install, configure, manage, upgrade and troubleshoot system devices.
	03.02	Describe the device and driver installation process.
	03.03	Identify, install, configure, and troubleshoot device drivers.
	03.04	Verify digital signatures of device drivers.
	03.05	Configure driver policies.
	03.06	Describe the security tools and features in operating systems and how to access them to perform a security audit and update.
	03.07	Install, configure and monitor firewalls to block dangerous incoming and outgoing network traffic.
	03.08	Install, configure and monitor anti-virus software.
	03.09	Perform anti-virus and other security scanning activities to prevent the infiltration of spyware and other malicious software.
	03.10	Install, configure and monitor updates, and perform system audits.
	03.11	Install, configure, upgrade, monitor and optimize security measures and policies.
	03.12	Perform preventive maintenance and activity monitoring for computer and network security.
04.0	Demonstrate understanding of internet structure, organization and navigation and how to support internet access and applications. – The student will be able to:	
	04.01	Describe the origin, structure, and history of the Internet and the World Wide Web.
	04.02	Describe Internet organizations, such as the Internic, IETF, domains and Requests for Comments (RFCs).
	04.03	Define and compare web-based marketing techniques.
	04.04	Describe e-commerce.
	04.05	Differentiate among an intranet site, an extranet site, and an Internet site.
	04.06	Characterize the role of the Internet in today's society.
	04.07	Describe several major ethical issues related to Internet use.

04.08	Identify legal issues related to Internet use.
04.09	Identify how the Internet affects intellectual property rights.
04.10	Identify how the Internet affects personal security and privacy.
04.11	Describe the World Wide Web (WWW).
04.12	Demonstrate the use of transfer protocols.
04.13	Demonstrate the use of typical remote access mechanisms.
04.14	Describe components of a URL.
04.15	Use Internet tools and utilities effectively.
04.16	Install and configure an Internet browser.
04.17	Install and configure browser add-ons and plug-ins.
05.0	Install, configure, use, manage, and troubleshoot microcomputer operating system. – The student will be able to:
05.01	Identify the fundamental principles of operating systems.
05.02	Describe the general features and uses of current operating systems.
05.03	Compare and contrast features of popular operating systems.
05.04	Identify the names, locations, purposes, and contents of major operating system files.
05.05	Use command line functions and utilities to manage the operating system, including proper syntax and switches.
05.06	Create, view, and manage disks, directories and files, and change file attributes.
05.07	Identify the major operating system utilities, their purpose, location, and options.
05.08	Install major operating systems and bring the operating system to a basic operational level.
05.09	Perform operating system upgrades.
05.10	Create an emergency boot disk with utilities utilizing basic system boot sequences and boot methods.
05.11	Optimize the operating system and major operating system subsystems.
05.12	Distinguish and interpret the meaning of common error codes and startup messages from the boot sequence and identify steps to correct the problems.
05.13	Recognize when to use common diagnostic utilities and tools.

05.14	Select and use system utilities and tools to diagnose, troubleshoot and resolve operating system problems.
05.15	Detect and resolve common operational and usability problems.
05.16	Discuss the network protocols used by operating systems.
05.17	Explain how networking is supported by various operating systems.
05.18	Configure operating systems to connect to a local area network.
05.19	Establish Internet connectivity.
05.20	Configure operating systems to connect to and use Internet resources.
05.21	Troubleshoot and diagnose basic network and Internet connectivity problems.
06.0	Create and maintain database objects, store, retrieve and manipulate data stored in a relational database. – The student will be able to:
06.01	Define what a database is and describe the components and structures of relational databases.
06.02	Explain the fundamental concepts of database design.
06.03	Design a relational database with multiple tables.
06.04	Determine the appropriate field data type and field size for fields in a table.
06.05	Create and modify tables, queries, forms and reports.
06.06	Insert, update, and delete data and records.
06.07	Create basic table relationships and relate tables in a database.
06.08	Identify the data elements by which to relate tables.
06.09	Describe foreign keys and their use when relating tables.
06.10	Interpret an entity relationship diagram for modeling a database.
06.11	Describe the purpose of SQL statements.
06.12	Define, describe and implement a query.
06.13	Write and implement basic queries formatted for specific output.
06.14	Retrieve information from a database by using query and filter tools.
06.15	Describe the use of SELECT statements including the use of various JOIN, SUBQUERIES, and conditional expressions.

	06.16	Describe the advantages of using an index, and implement different types of indexes on tables.
	06.17	Perform basic database maintenance.
	06.18	Monitor and analyze database performance.
	06.19	Backup and restore a database.
07.0	Demonstrate knowledge of networking technologies, networking hardware, and data communication concepts, protocols, and routing methods. – The student will be able to:	
	07.01	Identify the advantages and disadvantages of networked and non-network environments.
	07.02	Describe current networked environments, such as peer-to-peer and client/server.
	07.03	Identify and discuss issues such as security, privacy and redundancy related to networked environments.
	07.04	Identify and discuss issues related to naming conventions for domains, hosts, users, email, and network devices.
	07.05	Differentiate between telecommunications and data communications.
	07.06	List and define the layers in the OSI and TCP/IP network protocol models.
	07.07	Identify and describe current relevant IEEE network standards.
	07.08	Describe and illustrate the typical logical and physical network topologies, and explain the advantages and disadvantages of each topology.
	07.09	Describe the major functions and implementation of LAN hardware protocols such as Ethernet, and identify the physical components currently in use.
	07.10	Describe the LAN software protocols in current use.
	07.11	Discuss the characteristics of IP addresses and MAC addresses, and mapping between protocol addressing schemes.
	07.12	Differentiate between hardware used to implement different network topologies, including bus, ring and star.
	07.13	Identify and describe the current cable technologies, including shielded and unshielded twisted-pair, coaxial, and fiber optic, and their features including bandwidth, performance, plenum characteristics, and interference rejection.
	07.14	Describe current wireless technologies including Wi-Fi, blue tooth, satellite, microwave, radio and infrared.
	07.15	Describe the advantages and disadvantages of wireless and cable technologies, and identify the environments best suited for each technology.
	07.16	Describe the functions and characteristics of network connectivity hardware, included hubs, repeaters, bridges, switches, access units, routers, and gateways.
	07.17	Describe the hardware needed to connect a local area network to a wide area network and the Internet.
	07.18	Compare and contrast major functions and features of current network operating systems, including directory and other services.

	07.19	Describe the major functions of network server hardware and software components.
	07.20	Install and configure a network server, including the installation of network hardware and software.
	07.21	Describe the major functions of network client hardware and software components.
	07.22	Install and configure network client software on multiple computer platforms with support for multiple network protocols.
	07.23	Describe the function of network storage devices and other peripherals, including NAS, SAN, RAID, tape backup, printers, telecommunications devices, scanners, copiers, imaging devices, and document center equipment.
	07.24	Install and configure storage devices and other peripherals with network access.
	07.25	Install, configure, update and troubleshoot network drivers for network hosts and peripherals.
	07.26	Configure and troubleshoot network protocol stacks.
	07.27	Describe the characteristics of the current wide area network technologies and determine the most suitable WAN technology for a given situation.
08.0	Install, configure, manage, deploy, monitor and troubleshoot Windows applications in a networked Windows environment. – The student will be able to:	
	08.01	Analyze the business environment and select a Windows deployment and licensing method.
	08.02	Describe the major steps and issues associated with Windows deployment and draft a Windows migration strategy.
	08.03	Describe, install and configure the Windows deployment tools.
	08.04	Perform data and user backup for migration to a new Windows environment.
	08.05	Prepare, install and test a Windows Reference System including Service Packs and updates, device drivers, and base utilities and applications for the creation of a Windows client image.
	08.06	Configure the Windows Reference System's settings to optimize performance, automate security and Windows updates, provide network access and administrative controls, and standardize Windows features to comply with business needs.
	08.07	Create, capture, test and manage the custom image of the Windows Reference System.
	08.08	Deploy the Windows Reference System to client computers in a networked environment.
	08.09	Migrate current applications and user data after deployment and verify and troubleshoot deployment issues.
	08.10	Configure, manage and troubleshoot Windows device drivers, network settings, peripheral devices and printers.
	08.11	Join the Windows client to a domain and configure group policies.
	08.12	Describe methods of establishing and controlling group policies.
	08.13	Create, modify and administer local and domain users and groups for a Windows client.

	08.14	Configure, manage and troubleshoot Windows client mobile features including configuring mobile devices, power management, disk encryption, wireless networking, VPN and remote access.
	08.15	Configure, manage and troubleshoot Windows client access to the network, network resources, and the Internet.
	08.16	Configure, manage and troubleshoot administrative settings including: group policies, user profiles, permissions, user account control, event viewing, forwarding and logging, task scheduler, performance monitoring, Windows updates, security settings, firewall features, and authentication.
	08.17	Analyze business needs and licensing requirements in the selection of enterprise applications for deployment in networked environment.
	08.18	Assess Windows hardware requirements and compatibility with existing applications and devices.
	08.19	Perform application performance and compatibility testing and troubleshooting prior to application software installation.
	08.20	Install and configure business application.
	08.21	Deploy single license applications on a client computer.
	08.22	Troubleshoot application software installation and compatibility issues.
	08.23	Describe the role of desktop support in a Windows domain environment.
	08.24	Perform management, testing, and troubleshoot activities.
	08.25	Document incidents and support activities.
	08.26	Perform post-installation tasks, compatibility and reliability testing, resolve performance issues, and perform a security audit.
	08.27	Utilize hardware and software installation tools to perform testing, maintenance and updates.
	08.28	Perform support functions for Windows clients, users and deployed applications, including end user support and training.
	08.29	Configure, manage and monitor administrative features and security settings.
	08.30	Document installed software, conduct license auditing, create a performance baseline, and draft a troubleshooting checklist.
09.0	Foundations of project management. – The student will be able to:	
	09.01	Describe the steps in planning and managing a project.
	09.02	Define an implementation schedule for a project.
	09.03	Participate in group discussions.
	09.04	Choose appropriate actions in situations that require effective time management.

09.05	Describe a project life cycle from initiation to planning through execution, acceptance, support, quality, budgeting, and closure.
09.06	Understand the factors contributing to risk management planning.
09.07	Understand the cultural, social, international, political and physical aspects of the project environment.
10.0	Perform customer service skills. – The student will be able to:
10.01	Identify and recognize user's state of mind and attitude.
10.02	Determine the customer needs using system analysis strategies.
10.03	Listen to the customer and ask appropriate questions.
10.04	Maintain a professional demeanor when dealing with difficult customers.
10.05	Provide suggested solutions using knowledge base.
10.06	Project professional appearance and demeanor.
10.07	Promote company services, products, and policies when appropriate.
10.08	Use tact when dealing with customers and competitors.
10.09	Maintain professional work ethics and follow policies and procedures.
10.10	Respect customer work space/environment.
10.11	Relate all information to customer in a manner that the customer can understand.
10.12	Set realistic expectations when establishing deadlines for customer solutions.
10.13	Communicate action plan including timelines.
10.14	Recognize the existence of internal/external customers and follow appropriate guidelines for each.

Information Technology Support Specialization Standards	
11.0	Demonstrate proficiency in supporting Windows-based client and network computer systems. – The student will be able to:
11.01	Describe the features and characteristics of a well-deployed and operational client computer in a Windows networked environment.
11.02	Perform baseline measurements, perform security and performance audits on a client computer, and document findings.
11.03	Describe the methods of establishing, configuring and controlling group policies.
11.04	Configure and troubleshoot group policy settings for client computers in a Windows domain.
11.05	Configure, manage and troubleshoot task scheduler, event forwarding and monitoring tools on a Windows client computer.
11.06	Test, configure and schedule Windows updates, patches and service packs prior to and after network-wide deployment.
11.07	Troubleshoot Windows performance, reliability, and security issues.
11.08	Configure, manage, maintain and troubleshoot Windows security issues, including adding trusted sites, installing secure plug-ins, identifying group policy restrictions, obtaining certificates, analyzing services and programs.
11.09	Install, manage and maintain anti-malicious software, firewalls and access control.
11.10	Configure, troubleshoot and secure network protocols and services for Windows client computers.
11.11	Configure, enable, manage and troubleshoot VPN, mobile and remote access.
11.12	Troubleshoot, resolve and document network issues, including wired and wireless connectivity, name resolution issues conflicts IP address, routing problems, security breaches, domain issues and group policy problems.
11.13	Determine whether problems are a result of hardware issues, Windows issues, application failures, user errors or other reasons.
11.14	Monitor events in an enterprise network and log incidents.
12.0	Demonstrate proficiency in installing, configuring, deploying, and supporting desktop applications. – The student will be able to:
12.01	Perform advanced office application functions using word processing, spreadsheet, database, presentation, email, and web applications.
12.02	Test functionality and compatibility of desktop applications and updates with Windows operating system and the intended enterprise use.
12.03	Demonstrate the common steps to install desktop applications.
12.04	Configure and deploy desktop and enterprise applications in a networked environment.
12.05	Administer software license policies, including management of licenses and licensing restrictions, digital signing, and auditing.
12.06	Perform support functions for deployed applications.

12.07	Troubleshoot and resolve desktop application issues in a networked environment.
12.08	Describe how product standards in the IT field emerged.
12.09	Identify methods for evaluation and selection of products.
13.0	Demonstrate proficiency in supporting Windows users. – The student will be able to:
13.01	Configure the Windows interface and customize application features to meet user needs and to comply with ADA.
13.02	Configure and modify default user settings in Windows and application to maximize user performance and to comply with business policies.
13.03	Manage, maintain and backup Windows client computers according to business procedures and user needs without adversely affecting workplace activities.
13.04	Migrate user data, settings and profile to a newly deployed and configured Windows computer.
13.05	Configure, maintain and troubleshoot user account control and authentication issues, including resetting passwords, recovering encryption keys, modifying user accounts and group policies, and elevating privileges.
13.06	Determine whether a client is receiving regularly scheduled updates and resolve issues.
13.07	Configure and troubleshoot user access to network resources.
13.08	Perform a system recovery on a user computer and backup user data.
13.09	Describe methods of understanding and managing user's needs and expectations.
14.0	Perform help desk support activities. – The student will be able to:
14.01	Describe the various functions, operations, and departments within a business organization such as accounting, payroll, human resources and marketing.
14.02	Describe the role of the IT support function within the business organization.
14.03	Describe the incident management process and help desk service best practices when handling incidents.
14.04	Apply systematic problem-solving and troubleshooting processes to typical end-user issues.
14.05	Discuss the processes for resolving customer issues.
14.06	Describe strategies for handling difficult clients and incidents.
14.07	Identify and select a variety of tools and technologies that aid in the effective management of the help desk function.
14.08	Describe the process of identifying and resolving customer needs within the context of the business enterprise.
14.09	Describe the training process of end users and effective methods of delivering training materials.

14.10	Present and follow oral and written instructions.
14.11	Participate in group discussions as an IT support specialist and trainer.
14.12	Describe the types of end user documentation and the process of developing technical instructions for end users.
14.13	Prepare, outline, and deliver a short IT training presentation.
14.14	Use appropriate communication skills, courtesy, manners, and dress in the workplace.

Information Technology Analysis Specialization Standards	
11.0	Perform systems monitoring activities. – The student will be able to:
11.01	Create and review back up logs.
11.02	Create and review server logs.
11.03	Create and review application logs.
11.04	Create and review resolution logs.
11.05	Create and review security logs.
11.06	Prepare a schedule to verify applications status.
11.07	Prepare a schedule to verify backup status.
11.08	Prepare a schedule to verify server status.
11.09	Track network performance as compared to an established baseline.
11.10	Identify problem trends and create resolution plans.
11.11	Document statistical analysis and monitoring activities.
12.0	Perform computer information systems analysis activities. – The student will be able to:
12.01	Prepare appropriate systems and analysis charts and other visual aids.
12.02	Describe the major steps in the systems development cycle.
12.03	Perform basic business related tasks using the most appropriate software applications.
12.04	Identify situations where software packages and/or custom developed packages need to be integrated with each other.
12.05	Identify situations where software packages and/or hardware need to be integrated with software/hardware available on other types of computers.
12.06	Select appropriate hardware devices to accomplish assigned tasks.
12.07	Identify appropriate vendor sources for software, hardware and auxiliary supplies.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a “transfer value” assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following PSAV programs have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

PC Support Services (B070400) – 9 credits

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

CompTIA A+ (COMPT001) – 3 credits
CompTIA Server+ (COMPT009) – 3 credits
MCIT Certified IT Professional – Consumer Support Technician (MICRO027) – 3 credits

MCIT Professional - Enterprise Support Technician (MICRO033) – 3 credits
Microsoft Certified Desktop Support Technician (MICRO006) – 3 credits
Microsoft Certified Technology Specialist - Distributed Applications (MICRO047) – 3 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp .

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Help Desk Support Technician (0511010313) – 16/18 credit hours
Information Technology Support Specialist (0511010311) – 18/28 credit hours
Information Technology Analysis (0511010312) – 27/28 credit hours
Geographic Information System CCC (0545070213) – 21 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Database Technology (60)**
Career Cluster: **Information Technology**

AS	
CIP Number	1511010308
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as Database Administrators and Developers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

This program focuses on specific, transferable skills and stresses understanding and demonstration of the following elements of the database management and development industry: database creation, database management, database tuning, database software development, and database recovery.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of fundamental database concepts.
02.0 Demonstrate conceptual design principles.
03.0 Demonstrate the ability to create a database design.
04.0 Demonstrate an understanding of basic Data Definition Language and Data Manipulation Language SQL (Structured Query Language) syntax to create relational tables.
05.0 Demonstrate the ability to create, maintain, and delete sequences, indexes and synonyms and other schema objects.
06.0 Demonstrate the ability to query the database and optimize information retrieval.

In addition, students will complete the standards in one of the following specializations:

Microsoft Certified Database Administrator Specialization Standards

07.0 Demonstrate how to design and implement a data warehouse.
08.0 Demonstrate how to extract and transform data.
09.0 Demonstrate how to load data.
10.0 Demonstrate how to configure and deploy SSIS solutions.

Oracle Certified Database Administrator Specialization Standards

11.0 Demonstrate an understanding of the Oracle architectural components.
12.0 Demonstrate how to create an Oracle database instance.
13.0 Demonstrate how to manage an instance of the database.
14.0 Demonstrate how to maintain Redo log files, and how to use the data dictionary views.
15.0 Demonstrate how to manage tablespaces and datafiles.
16.0 Demonstrate an understanding of the Oracle storage structures.
17.0 Demonstrate the ability to query a database.
18.0 Demonstrate how to manage constraints and indexes.
19.0 Demonstrate a basic understanding of the Oracle Recovery Manager tool for performing backup and recovery operations.
20.0 Demonstrate the ability to perform backups.
21.0 Demonstrate the ability to perform recovery procedures.
22.0 Demonstrate how to configure and use a Flashback Database.
23.0 Demonstrate the different methods that are used to recover from user errors.
24.0 Demonstrate an understanding of how to detect and resolve block corruptions.
25.0 Demonstrate an understanding of the goals and processes of performance tuning.
26.0 Demonstrate capability to use the Oracle Database Resource Manager (DRM) to manage database and operating system performance.
27.0 Demonstrate how to automate management tasks, create scheduled jobs, programs, and schedules.
28.0 Demonstrate the ability to efficiently manage space-related inefficiencies of the database.
29.0 Demonstrate the ability to understand the issues with memory management and shall demonstrate how to configure memory manually.

30.0 Demonstrate the ability to set up an Oracle database to be deployed globally.
31.0 Demonstrate the ability to use Oracle diagnostic tools and the Oracle listener.

Oracle Certified Database Developer Specialization Standards

32.0 Demonstrate the use of general PL/SQL programming language fundamental constructs.
33.0 Demonstrate the use of DML simple selection statements in a PL/SQL block.
34.0 Demonstrate the use of conditional control IF and CASE statements.
35.0 Demonstrate the use of employing iterative control loops for iterating through a set of instructions.
36.0 Demonstrate the use of incorporating exception handling methods.
37.0 Demonstrate how to manipulate cursors and use parameters with cursors and complex nested cursors.
38.0 Demonstrate how to design and implement functions and procedures.
39.0 Demonstrate how to design and implement packages and triggers.
40.0 Demonstrate the use of collections to store and manipulate data.
41.0 Demonstrate how to manipulate large objects, such as LOB and BFILEs.
42.0 Demonstrate how to tune PL/SQL code and improve performance with caching.

Florida Department of Education
Student Performance Standards

Program Title: **Database Technology**
CIP Number: **1511010308**
Program Length: **60 credit hours**
SOC Code(s): **15-1141**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of fundamental database concepts. The student will be able to:
01.01	Define data.
01.02	Define information.
01.03	Describe the process by which information is derived from data.
01.04	Describe how a database is implemented.
01.05	Distinguish between variant database models, how they differ, and the advantages to each model.
01.06	Describe the advantages (i.e., improved data consistency, quality, integrity) and disadvantages of using databases (i.e., cost and complexity).
01.07	Conducting online research to locate and identify the different database engines, models, and providers.
01.08	Define and providing examples of a database transaction.
02.0	Demonstrate conceptual design principles. The student will be able to:
02.01	Perform a use case analysis and determining the functional requirements from use case.
02.02	Identify non-functional requirements that will affect a solution's design.
02.03	Analyze data requirements to determine data entities and attributes.
02.04	Analyze entities and attributes to determine their relationships.
02.05	Develop a conceptual model that captures the data flow and integrity constraints by using various components including:
02.05.1	base entity type.
02.05.2	bridging entity types.

	02.05.3 composite attribute.
	02.05.4 multivalued attribute.
	02.05.5 derived attribute.
	02.05.6 associative entity type.
	02.05.7 relationships between entity types.
	02.05.8 minimum and maximum cardinality constraints.
	02.05.9 deletion rules.
03.0	Demonstrate the ability to create a database design. The student will be able to:
	03.01 Describe all data types (e.g., CHAR, NUMBER).
	03.02 Discuss the basic tenets of proper database design by describing the impact of:
	03.02.1 Data duplication.
	03.02.2 Data redundancy.
	03.02.3 Data integrity.
	03.02.4 Implicit information storage.
	03.02.5 Referential integrity.
	03.03 Derive candidate keys by decomposition and synthesis.
	03.04 Describe and executing the general methods of design using 3NF (third-normal form) to eliminate redundancy, partial and transitive dependencies.
	03.05 Identify the primary key foreign key relationships between the entity types.
04.0	Demonstrate an understanding of basic Data Definition Language and Data Manipulation Language SQL (Structured Query Language) syntax to create relational tables. The student will be able to:
	04.01 Describe the basic characteristics of the Standard Query Language.
	04.02 Write SQL statements to create simple tables.
	04.03 Create data integrity controls.
	04.04 Change/update table definitions.
	04.05 Insert, update, and delete data/records.

	04.06 Describe referential integrity and how it is enforced.
	04.07 Describe the advantages of using an index, and implementing different types of indexes on tables.
	04.08 Describe how a database implements and uses indexing (i.e., B-Tree, Bitmap).
	04.09 Verify the existence of an index using the data dictionary.
	04.10 Describe foreign keys and their use when relating tables.
	04.11 Define the purpose of a sequence and how it can be used in a database.
	04.12 Create and removing a sequence.
05.0	Demonstrate the ability to create, maintain, and delete sequences, indexes and synonyms and other schema objects. The student will be able to:
	05.01 Define the purpose of a sequence and how it can be used in a database.
	05.02 Create and removing a sequence.
	05.03 Create indexes and removing indexes.
	05.04 Verify the existence of an index using the data dictionary.
06.0	Demonstrate the ability to query the database and optimize information retrieval. The student will be able to:
	06.01 Identify the data elements by which to relate tables.
	06.02 Retrieve row and column data from tables executing simple SELECT statements.
	06.03 Identify keywords, mandatory clauses, and optional clauses in a SELECT statement.
	06.04 Use character, number, and date functions in SELECT statements.
	06.05 Create a search condition using mathematical comparison operators.
	06.06 Use the WHERE clause to restrict the rows returned by a query.
	06.07 Sort rows that are retrieved by a query, and use ampersand substitution to restrict and sort output at runtime.
	06.08 Write SELECT statements to access data from more than one table using equijoins and non-equijoins.
	06.09 Join a table to itself using a self-join.
	06.10 View data that does not meet a join condition by using outer joins.
	06.11 Generate a Cartesian product of all rows from two or more tables.

06.12	Identify the available group functions (GROUP BY, HAVING, INTERSECT).
06.13	Describe the use of the group functions.
06.14	Group data by using the GROUP BY clause.
06.15	Include or exclude grouped rows by using the HAVING clause.
06.16	Write complex SELECT statements including the use of various JOIN, SUBQUERIES, and conditional expressions.
06.17	Discuss when it is appropriate to use a subquery, and describing the types of problems that subqueries can solve.
06.18	Identify which clauses can contain subqueries.
06.19	Write single-row and multiple-row subqueries.
06.20	Nest a subquery inside another subquery.

Microsoft Certified Database Administrator Specialization Standards	
07.0	Demonstrate how to design and implement a data warehouse. The student will be able to:
	07.01 Design and implement dimensions.
	07.02 Design and implement fact tables.
08.0	Demonstrate how to extract and transform data. The student will be able to:
	08.01 Define connection managers.
	08.02 Design data flow.
	08.03 Implement data flow.
	08.04 Manage SSIS package execution.
	08.05 Implement script tasks in SSIS.
09.0	Demonstrate how to load data. The student will be able to:
	09.01 Design control flow.
	09.02 Implement package logic by using SSIS variables and parameters.
	09.03 Implement control flow.
	09.04 Implement data load options.
	09.05 Implement script components in SSIS.
10.0	Demonstrate how to configure and deploy SSIS solutions. The student will be able to:
	10.01 Troubleshoot data integration issues.
	10.02 Install and maintain SSIS components.
	10.03 Implement auditing, logging, and event handling.
	10.04 Deploy SSIS solutions.

Oracle Certified Database Administrator Specialization Standards	
11.0	Demonstrate an understanding of the Oracle architectural components. The student will be able to:
	11.01 Define an Oracle Database, the Oracle server, and the Oracle Instance, and Oracle database memory architecture.
	11.02 Explain the differences between Oracle 10g client and server installation.
	11.03 Use the Oracle Universal Installer to install Oracle on a host machine.
	11.04 Establish a connection and creating a session to the database instance.
	11.05 Explain the physical structure, memory structure, and process structure of the Oracle database.
12.0	Demonstrate how to create an Oracle database instance. The student will be able to:
	12.01 Explain the steps needed to create a database.
	12.02 Identify the database administrative tools.
	12.03 Configure the initial settings for creating the database.
	12.04 Create, start, and stop a database instance.
	12.05 Explain the basic steps in managing the configuration parameter files, and using Net Manager to configure Oracle Net Services.
13.0	Demonstrate how to manage an instance of the database. The student will be able to:
	13.01 Create, manage, and use the initialization files: PFILE and SPFILE.
	13.02 Identify the various states of starting an instance.
	13.03 Identify the various options available to shutdown an instance.
	13.04 Monitor the Alert and Trace files.
14.0	Demonstrate how to maintain Redo log files, and how to use the data dictionary views. The student will be able to:
	14.01 Explain how the control file, data files, redo log files, and archive files are linked and work together.
	14.02 Explain the uses of the control file.
	14.03 List the contents of the control file.
	14.04 Maintain and manage the online redo log files.
	14.05 Obtain and archive online redo log file information.

	14.06 Use the Oracle Managed Files (OMF) to create, manage, and obtain information from the control files.
	14.07 Identify the use and contents of the data dictionary.
	14.08 Use the data dictionary to retrieve information about the database.
15.0	Demonstrate how to manage tablespaces and datafiles. The student will be able to:
	15.01 Describe the storage hierarchy.
	15.02 Differentiate between the logical and physical structures.
	15.03 Create many types of tablespaces.
	15.04 Configure and viewing storage for tablespaces and datafiles.
	15.05 Use and managing undo data.
	15.06 Describe and configuring diagnostic (trace) files.
16.0	Demonstrate an understanding of the Oracle storage structures. The student will be able to:
	16.01 Describe and differentiating between the logical and physical structure of the database (segments, extents, blocks).
	16.02 List the segment types and their uses.
	16.03 Maintain storage structures with automatic segment – space management.
	16.04 Maintain storage structures manually.
	16.05 Obtain storage structure information.
17.0	Demonstrate the ability to query a database. The student will be able to:
	17.01 Write basic SQL single row, datatype conversion, group, and user-defined functions.
	17.02 Write filtered, sorted, and aggregated queries.
	17.03 Write SQL statements using advanced queries involving joins, subqueries, and other specialized queries.
18.0	Demonstrate how to manage constraints and indexes. The student will be able to:
	18.01 List the different types of indexes, their uses, and constraints.
	18.02 Develop an example of each type of index.
	18.03 Create index-organized tables.

	18.04 Create, modify, and drop constraints.
	18.05 Maintain indexes.
	18.06 Identify unused indexes.
19.0	Demonstrate a basic understanding of the Oracle Recovery Manager tool for performing backup and recovery operations. The student will be able to:
	19.01 Explain the different backup options available to the database administrator.
	19.02 Describe the Recovery Manager architecture.
	19.03 Start RMAN to connect to the database.
	19.04 Describe the different settings used to configure the persistent RMAN parameters.
20.0	Demonstrate the ability to perform backups. The student will be able to:
	20.01 Explain the purpose of the Flash Recovery area.
	20.02 Describe the various types of backups.
	20.03 Perform block-level backups.
	20.04 Implement the commands for performing backups at various levels.
	20.05 Demonstrate the use of the RUN command.
	20.06 Set Duration and Throttling.
	20.07 Explain the Block Tracking feature.
	20.08 Use RMAN commands to display information about backups.
21.0	Demonstrate the ability to perform recovery procedures. The student will be able to:
	21.01 Identify the different types of failures that occur in the database.
	21.02 Perform a complete recovery on a database.
	21.03 Perform an incomplete recovery on a database.
	21.04 Demonstrate how to perform a recovery of non-critical files.
22.0	Demonstrate how to configure and use a Flashback Database. The student will be able to:
	22.01 Explain the Flashback Database feature.
	22.02 Describe the components of Flashback Database.

	22.03 Explain the guidelines and restrictions of Flashback Database.
	22.04 Configure, maintain, and monitor Flashback Database.
	22.05 Perform Flashback Database using SQL, RMAN, and Enterprise Manager.
	22.06 Resolve errors that may occur during the Flashback Database creation operation.
23.0	Demonstrate the different methods that are used to recover from user errors. The student will be able to:
	23.01 Describe the Flashback Technology features available in Oracle.
	23.02 Explain the configuration and implementation of the Flashback Drop operation.
	23.03 Manage the recycle bin.
	23.04 Explain the configuration and implementation of the Flashback Query operation.
	23.05 Recover from user errors using the Flashback Versions Query operation.
	23.06 Perform transaction level recovery using Flashback Transaction Query operation.
	23.07 Explain the configuration and implementation of the Flashback Table.
24.0	Demonstrate an understanding of how to detect and resolve block corruptions. The student will be able to:
	24.01 Describe what block corruption is.
	24.02 Identify instances of block corruptions.
	24.03 Resolve block corruptions.
	24.04 Use the ANALYZE command to check the integrity of a schema object (i.e., tables and indexes).
	24.05 Describe the use of the DBVERIFY utility.
	24.06 Utilize the DB_BLOCK_CHECKING parameter.
	24.07 Execute the DBMS_REPAIR package.
	24.08 Perform Block Media recovery using RMAN.
25.0	Demonstrate an understanding of the goals and processes of performance tuning. The student will be able to:
	25.01 Describe the job roles in performance tuning.
	25.02 List the steps in the tuning phases.

	25.03 Explain tuning goals and service level agreements.
	25.04 Describe common performance problems.
	25.05 Explain the tuning methodology.
26.0	Demonstrate how to use the Oracle Database Resource Manager (DRM) to manage database and operating system performance. The student will be able to:
	26.01 Explain the purpose of the Data Resource Manager.
	26.02 Describe each of the components of the DRM.
	26.03 Create consumer groups.
	26.04 Create resource plans.
	26.05 Create resource plan directives.
	26.06 Use the DRM to automatically map user sessions with consumer groups.
	26.07 Obtain information about database performance using the DRM.
27.0	Demonstrate how to automate management tasks, create scheduled jobs, programs, and schedules. The student will be able to:
	27.01 Use the Oracle Scheduler to create jobs, programs, and schedule tasks.
	27.02 Reuse the Scheduler to view information about job executions and job instances.
	27.03 Use the Scheduler to perform automatic gathering of optimizer statistics.
	27.04 Use the Scheduler to automatically gather object statistics to make efficient decisions about execution plans.
28.0	Demonstrate the ability to efficiently manage space-related inefficiencies of the database. The student will be able to:
	28.01 Tune redo writing and archiving operations.
	28.02 Set and modifying thresholds for space usage.
	28.03 Manage tablespace usage to reduce space-related error conditions.
	28.04 Use different storage options to improve the performance of queries.
	28.05 Manage Resumable Space Allocation using the DBMS_RESUMABLE package.
29.0	Demonstrate the ability to understand the issues with memory management and shall demonstrate how to configure memory manually. The student will be able to:
	29.01 Explain the memory structures in the Oracle instance and their function.
	29.02 Manually configure memory structures of the System Global Area (SGA).

	29.03 Implement Automatic Shared Memory Management.
	29.04 Configure the SGA parameters for various memory components in the SGA manually.
	29.05 Configure memory structures of the Program Global Area manually.
30.0	Demonstrate the ability to set up an Oracle database to be deployed globally. The student will be able to:
	30.01 Customize language-dependent behavior for the database and individual sessions.
	30.02 Specify different linguistic sorts for queries.
	30.03 Use date-time data types for different time zones.
	30.04 Query data using case-sensitive and accent-insensitive searches.
	30.05 Obtain globalization support configuration information.
31.0	Demonstrate the ability to use Oracle diagnostic tools and the Oracle listener. The student will be able to:
	31.01 Describe the purpose and use of the diagnostic tools that are available within the database.
	31.02 Describe the vulnerabilities of the listener and the different methods that can be used to secure it.

Oracle Certified Database Developer Specialization Standards	
32.0	Demonstrate the use of general PL/SQL programming language fundamental constructs. The student will be able to:
32.01	Employ PL/SQL language components including variables and identifiers.
32.02	Make use of anchored data types.
32.03	Explain the use of a block, nested block, and labels.
33.0	Demonstrate the use of DML simple selection statements in a PL/SQL block. The student will be able to:
33.01	Use the SELECT INTO syntax for variable initialization.
33.02	Use Data Manipulation Language statement sin a PL/SQL block.
33.03	Make use of a sequence in a PL/SQL block.
33.04	Make use of the COMMIT, ROLLBACK, and SAVEPOINT commands in a PL/SQL block.
34.0	Demonstrate the use of conditional control IF and CASE statement. The student will be able to:
34.01	Use the IF-THEN, and IF-THEN-ELSE control statements.
34.02	Use nested IF statements.
34.03	Use the CASE statement in a procedural block of code.
34.04	Use a CASE expression.
35.0	Demonstrate the use of employing iterative control loops for iterating through a set of instructions. The student will be able to:
35.01	Use simple loops with EXIT conditions.
35.02	Use simple loops with EXIT WHEN conditions.
35.03	Use WHILE loops.
35.04	Use numeric FOR loops with the IN and REVERSE option.
36.0	Demonstrate the use of incorporating exception handling methods. The student will be able to:
36.01	Explain the use of error handling methods.
36.02	Use built-in exception handling mechanisms.
36.03	Create user-defined exceptions.

37.0	Demonstrate how to manipulate cursors and use parameters with cursors and complex nested cursors. The student will be able to:
	37.01 Utilize cursor attributes to control the memory where statements are executed.
	37.02 Process an explicit cursor.
	37.03 Use cursors to fetch rows.
	37.04 Use cursors for loops.
	37.05 Use parameters in a cursor.
	37.06 Use complex nested cursors.
	37.07 Use FOR UPDATE and WHERE CURRENT clause in a cursor.
38.0	Demonstrate how to design and implement functions and procedures. The student will be able to:
	38.01 Create procedures.
	38.02 Query the data dictionary for information on procedures.
	38.03 Use IN and OUT parameters with procedures.
	38.04 Create stored functions.
	38.05 Invoke functions with SQL statements.
39.0	Demonstrate how to design and implement packages and triggers. The student will be able to:
	39.01 Create package specifications.
	39.02 Create package bodies, package variables and cursors.
	39.03 Call stored packages.
	39.04 Write triggers in response to DML, DDL, system and user generated events.
40.0	Demonstrate the use of collections to store and manipulate data. The student will be able to:
	40.01 Use associative arrays.
	40.02 Use nested tables.
	40.03 Create table-based and cursor-based records.
	40.04 Create and use user-defined records.

41.0	Demonstrate how to manipulate large objects, such as LOB and BFILEs. The student will be able to:
	41.01 Describe a LOB object.
	41.02 Use BFILEs.
	41.03 Use DBMS_LOB.READ and DBMS_LOB.WRITE to manipulate LOBs.
	41.04 Create a temporary LOB programmatically with the DBMS_LOB package.
	41.05 Use SecureFile LOBs to store documents.
	41.06 Convert BasicFile LOBs to SecureFile LOB format.
	41.07 Enable reduplication and compression.
42.0	Demonstrate how to tune PL/SQL code and improve performance with caching. The student will be able to:
	42.01 Describe result caching.
	42.02 Use SQL query result cache.
	42.03 Use PL/SQL function cache.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

Oracle Certified Associate (ORACL001) – 6 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp .

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 60 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Microsoft Certified Database Administrator (0511020309) – 15 credit hours
Oracle Certified Database Administrator (0511020307) – 15 credit hours
Oracle Certified Database Developer (0511020308) – 15 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Computer Programming and Analysis**
Career Cluster: **Information Technology**

AS	
CIP Number	1511020101
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as entry level programmers, programmer specialists, computer programmers, senior programmers, chief business programmers, programmer analysts, and information systems programmers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content prepares individuals to analyze business situations and to design, develop and write computer programs; to store, locate, and retrieve specific documents, data, and information; analyze problems using logic/analysis tools, code into computer language; test, monitor, debug, document and maintain computer programs.

More than one programming language should be addressed in this degree program.
Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform data file activities.
02.0 Perform analysis activities.
03.0 Perform program design activities.
04.0 Perform coding activities.
05.0 Perform testing activities.
06.0 Perform user-training activities.
07.0 Perform implementation activities.
08.0 Perform user support activities.
09.0 Perform evaluation activities.
10.0 Demonstrate professional development skills.
11.0 Demonstrate employability skills.
12.0 Demonstrate general workplace competencies.

Florida Department of Education
Student Performance Standards

Program Title: **Computer Programming and Analysis**
CIP Number: **1511020101**
Program Length: **60 credit hours**
SOC Code(s): **15-1131**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:
01.0 Perform data file activities. – The student will be able to:
01.01 Identity methods of file organization.
01.02 Select an efficient method of file organization for a given situation.
01.03 Identify security procedures to maintain integrity of files.
02.0 Perform analysis activities. – The student will demonstrate proficiency in analysis of information technology systems and be able to:
02.01 Communicate with users to ascertain system requirements.
02.02 Develop information system requirements to accomplish specific task.
02.03 Analyze and document user requirements.
02.04 Evaluate alternative solutions.
02.05 Analyze and document system requirements.
02.06 Create a plan for the design phase of an information technology system.
02.07 Develop a timeline for system development.
02.08 Communicate the plan.
02.09 Develop systems specifications.
02.10 Develop systems documentation.
02.11 Evaluate system performance.

	02.12 Demonstrate understanding of technical and operational feasibility issues in determining a system solution.
	02.13 Demonstrate knowledge, skills, and application of information systems to accomplish specific job objectives.
03.0	Perform program design activities. – The student will be able to demonstrate proficiency in design of information technology systems and:
	03.01 Demonstrate knowledge of computer concepts and terminology.
	03.02 Demonstrate understanding of computer systems architecture including components, networked environments, and operating systems.
	03.03 Develop design specifications.
	03.04 Select a feasible development environment.
	03.05 Validate design specifications.
	03.06 Document design.
	03.07 Communicate design specifications.
	03.08 Develop prototype.
	03.09 Assist in revisions and enhancements of software systems.
04.0	Perform coding activities. – The student will be able to demonstrate proficiency in software fundamentals including control and data structures utilizing structured and object-oriented programming methodologies and will be able to:
	04.01 Identify modules.
	04.02 Design modules.
	04.03 Code modules.
	04.04 Document modules.
	04.05 Test modules.
	04.06 Debugging code.
	04.07 Revise code.
	04.08 Assemble modules.
	04.09 Demonstrate proficient use of programming development tools.
	04.10 Identify and use best practices to secure program code.

05.0	Perform testing activities. – The student will be able to:
	05.01 Develop test plan.
	05.02 Develop test data.
	05.03 Validate input(s).
	05.04 Perform test(s).
	05.05 Validate expected outcomes.
	05.06 Determine boundary test cases.
	05.07 Load-test the system.
	05.08 Revise program code as necessary.
	05.09 Document test results.
06.0	Perform user-training activities. – The student will be able to:
	06.01 Assist in development of user documentation.
	06.02 Assist in development of training plan.
	06.03 Demonstrate appropriate user training techniques.
07.0	Perform implementation activities. – The student will be able to:
	07.01 Develop an implementation plan.
	07.02 Install system.
	07.03 Validate system.
	07.04 Troubleshoot methodologies.
	07.05 Document implementation.
08.0	Perform user-support activities. – The student will be able to:
	08.01 Demonstrate proficient use of productivity software (word processing, spreadsheets, databases, presentation) skills.
	08.02 Demonstrate appropriate communication and interpersonal skills.
	08.03 Determine the customer needs using system analysis strategies.

08.04	Listen to the customer and ask appropriate questions.
08.05	Persist when dealing with difficult customers maintaining a professional demeanor.
08.06	Provide suggested information technology solutions using knowledge base.
08.07	Understand how to research and understand specific corporate culture.
08.08	Use tact when dealing with customer and competitors.
08.09	Maintain professional work ethics and follow policies and procedures.
08.10	Respect customer work space/environment.
08.11	Set realistic expectations when establishing deadlines for customer solutions.
08.12	Communicate action plan including timelines.
08.13	Recognize the existence of internal/external customers and follow appropriate guidelines for each.
09.0	Perform evaluation activities. – The student will be able to:
09.01	Review software development plans.
09.02	Assess validity and performance of software systems.
09.03	Identify improvements to software systems.
09.04	Assist in revisions and enhancements of software systems.
09.05	Assist in project evaluation.
09.06	Recommend improvements.
09.07	Provide feedback to management, users and peer groups.
10.0	Demonstrate professional development skills. – The student will be able to:
10.01	Use on-line resources related to employee job requirements.
10.02	Understand the importance of continuing development activities such as reading industry journals and magazines; attending trade shows, seminars and other continuing professional development activities; participating in professional organizations and developing professional contacts for future projects.
10.03	Develop insights and skills through structured experimentation.
10.04	Anticipate future industry trends.

10.05	Understand the evolving nature of information technology systems and necessity of flexibility and willingness to implement needed changes.
10.06	Set career goals/directions.
10.07	Build mentor relationships.
11.0	Demonstrate employability skills. – The student will be able to:
11.01	Demonstrate business communication skills such as producing applications, business letters and memos, and resumes.
11.02	Understand appropriate workplace dress and demeanor for specific corporate cultures.
11.03	List representative jobs and career paths for people trained in the computer programming field.
11.04	List several functions of each representative computer programming job and career path.
12.0	Demonstrate general organizational computing workplace competencies. – The student will be able to:
12.01	Follow oral and written instructions.
12.02	Prepare, outline, and deliver a short oral presentation.
12.03	Participate in analysis, design, coding, implementation and documentation activities as a team member and as a group leader.
12.04	Utilize research skills to obtain appropriate information, graphics and other data needed.
12.05	Prepare visual material to support an oral presentation.
12.06	Demonstrate self-motivation and responsibility to complete an activity.
12.07	List the steps in problem solving.
12.08	Choose appropriate action in situations requiring effective time management.
12.09	Identify and discuss issues contained within professional codes of conduct.
12.10	Identify and discuss software licensing issues.
12.11	Identify and discuss property rights and licensing issues.
12.12	Identify and discuss privacy issues.
12.13	Identify and discuss encryption issues.
12.14	Identify legal liability issues.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Computer Programming Specialist (0511020103) – 18 credit hours
Computer Programmer (0511020200) – 33/36 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Internet Services Technology**
Career Cluster: **Information Technology**

AS	
CIP Number	1511080102
Program Type	College Credit
Standard Length	63 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as Internet/Intranet Technicians, Web Technicians, Internet/Intranet Administrators, Web Administrators, Internet/Intranet Developers, Web Site Developers, Internet/Intranet Masters, Web Masters, Internet support specialists, Web page designers, Web database administrators, Internet managers, Web technicians, Web site developers, Web managers, or Web architects in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to work in Internet, Intranet, and Extranet environments; installing, configuring, designing and managing Intranet and web-based resources

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 63 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency with Internet structure, organization, and navigation.
02.0 Demonstrate understanding of networked environments, hardware and software.
03.0 Perform server installation and configuration activities.
04.0 Understand, install and configure computer hardware.
05.0 Understand, install and configure computer software.
06.0 Perform enterprise architecture-related tasks.
07.0 Perform web design/development activities.
08.0 Perform programming and scripting activities.
09.0 Perform testing/troubleshooting activities.
10.0 Perform security activities.
11.0 Perform web site management activities.
12.0 Perform e-commerce-related tasks.
13.0 Perform quantitative analysis activities.
14.0 Demonstrate professional development skills.
15.0 Perform Documentation and Technical reference activities.
16.0 Demonstrate employability skills.
17.0 Perform general organizational computing workplace competencies.

Florida Department of Education
Student Performance Standards

Program Title: **Internet Services Technology**
CIP Number: **1511080102**
Program Length: **63 credit hours**
SOC Code(s): **15-1199**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency with Internet structure, organization, and navigation. – The student will be able to:
01.01	Describe the origin of the Internet.
01.02	Outline the history of the Internet.
01.03	Describe Internet organization, such as the Internic, domains and requests for comments (RFCs).
01.04	Describe the structure of the Internet.
01.05	Differentiate between the Internet and the WWW.
01.06	Define Internet push technologies, such as e-mail marketing vs. Web page banner advertising.
01.07	Differentiate among an Intranet site, an extranet site, and an Internet site.
01.08	Characterize the role of the Internet in today's society.
01.09	Describe several major ethical issues related to Internet use.
01.10	Identify several legal issues related to Internet use.
01.11	Identify several examples to show how the Internet has affected intellectual property rights.
01.12	Identify several examples to show how the Internet has affected personal security and privacy.
01.13	Describe the World Wide Web (WWW).
01.14	Provide several examples to show how the WWW has affected our society.
01.15	Demonstrate the use of typical file types and protocols (http:, ftp:, mailto:, gopher: telnet:).
01.16	Demonstrate the use of typical remote access mechanisms.

01.17	Differentiate among all valid WWW file types.
01.18	Differentiate among all WWW multimedia file types.
01.19	Describe components of URL and their meanings (including types).
01.20	Effectively use Internet tools and utilities such as e-mail, browsers, search engines, news groups, list serves, chat rooms, file transfers.
01.21	Install and configure an Internet browser.
01.22	Install and configure browser add-ons and plug-ins.
01.23	Install and configure a newsgroup reader.
01.24	Install and configure a chat group client.
02.0	Demonstrate understanding of networked environments, hardware, and software. – The student will be able to:
02.01	Give several advantages and disadvantages of networked and non-networked environments.
02.02	Describe current network environments, such as peer-to-peer and client/server.
02.03	Identify and discuss issues such as security, privacy and redundancy related to networked environments.
02.04	Identify and discuss issues related to naming conventions for user-ids, email, passwords, and network devices.
02.05	List and define layers in the OSI and TCP/IP network protocol models.
02.06	Identify and describe current relevant IEEE network standards.
02.07	Illustrate typical network topologies.
02.08	Identify advantages and disadvantages of each topology.
02.09	Describe the major functions of LAN hardware protocols such as Ethernet, token ring, FDDI, and arcnet.
02.10	Describe LAN software protocols such as IPX/SPX, TCP/IP, and NetBEUI.
02.11	Discuss the nature of IP addresses and MAC addresses, and mapping between protocol addressing schemes.
02.12	Describe the major functions of network server hardware and software components.
02.13	Describe server hardware requirements.
02.14	Describe the hardware needed for hosting a Web site.
02.15	Identify a variety of specialized servers (e.g. proxy, e-mail, DHCP, Web).

02.16	Describe the hardware requirements for specialized servers such as e-mail and database.
02.17	Describe the major functions of network client hardware components.
02.18	Describe client hardware requirements.
02.19	Differentiate between hardware used to implement different topologies such as token ring and Ethernet.
02.20	Recognize and describe current cable technologies such as twisted-pair, coaxial, and fiber optic, and identifying issues associated with plenum verses non-plenum cable plants.
02.21	Describe current wireless technologies such as satellite, microwave, spread spectrum RF, and infrared.
02.22	Identify advantages and disadvantages of wireless and cable technologies.
02.23	Cite appropriate uses of wireless and cable technologies.
02.24	Describe the major functions of network connectivity hardware, such as hubs, repeaters, bridges, routers, switches, and gateways.
02.25	Describe the hardware needed to connect a LAN to the Internet.
02.26	Describe the function of network storage devices and other peripherals (RAID, CD towers, printers, fax machines, scanners, printer/fax/copiers, imaging devices, document center equipment).
02.27	Compare and contrast major functions and features of current network operating systems (including directory services).
02.28	Differentiate between telecommunications and data communications.
02.29	Compare and contrast digital communications lines and cable characteristics (e.g. ISDN, DSL, T-1, T-3).
03.0	Perform server installation and configuration activities. – The student will be able to:
03.01	Evaluate, install and configure software for Web page authoring.
03.02	Install and configure drivers for NICs and network peripherals.
03.03	Configure protocol stacks.
03.04	Configure a server for multiple network protocols and frame types.
03.05	Configure a server to handle multiple languages for international applications.
03.06	Install and configure an Internet server.
03.07	Install, configure and set up a proxy server and a gateway.
03.08	Set up a server for remote access.
03.09	Address security issues raised by the ability to access server remotely.

03.10	Discuss the functions of authentication servers, RADIUS, and VPN.
03.11	Configure commerce server and database.
03.12	Install and configure list-serve, chat, and news group servers.
03.13	Plan component integration.
03.14	Test component integration.
03.15	Integrate components.
04.0	Understand, Install and configure computer hardware. – The student will be able to:
04.01	Explain the use of binary numbers to represent instructions and data.
04.02	Describe the hardware implications of the use of binary representation of instructions and data.
04.03	Convert numbers among decimal, binary, and hexadecimal representation.
04.04	Perform binary arithmetic.
04.05	Identify various coding schemes (ASCII).
04.06	Discuss various data types such as signed and unsigned integers and floating point.
04.07	Identify the major hardware platforms.
04.08	Describe distinguishing features of the major hardware platforms.
04.09	Describe the functions of major hardware components of a computer system.
04.10	Recognize and correctly identify computing hardware components.
04.11	Describe emerging hardware technologies and discuss their potential impact.
04.12	Implement proper procedures for handling and safeguarding equipment.
04.13	Perform preventive maintenance tasks on microcomputer systems.
04.14	Describe procedures for proper disposal of computer components.
04.15	Set up and configure systems and peripherals.
04.16	Set up BIOS.
04.17	Install and configure storage and I/O device interfaces.

04.18	Install and configure multimedia devices and interfaces.
04.19	Install and configure network interface cards.
05.0	Understand, Install and configure computer software. – The student will be able to:
05.01	Describe the functions and major components (BIOS and task management) of a computer operating system.
05.02	Identify current operating systems and describe their important features.
05.03	Use an operating system for activities such as data and file management.
05.04	Identify current systems utilities and describe their functions.
05.05	Use system software to perform routine maintenance tasks such as backup, and hard drive defragmentation.
05.06	Use operating systems of different brands and platforms.
05.07	Use both stand-alone operating systems and network operating systems.
05.08	Create, use, and maintain system configuration files.
05.09	Describe the major features and functions of the major categories of applications software (word processing, database, spreadsheet, presentation, email, browsers).
05.10	Use basic features of office productivity software.
05.11	Learn to perform independently (previously untaught) tasks using office productivity software.
05.12	Use software produced by multiple vendors.
05.13	Transmit and exchange data in a multiple vendor software environment.
05.14	Install and configure a microcomputer operating system.
05.15	Describe procedures for uninstalling operating system software.
05.16	Install and configure system software.
05.17	Install and configure applications software.
05.18	Configure software for accessibility by disabled individuals.
05.19	Install and configure applications software upgrades.
05.20	Describe modifications necessary to an operating system such as modifying parameters and how to handle conflicting interrupts when installing, configuring and upgrading typical applications software.
05.21	Install and configure client software for connecting to LANs, WANs, and the Internet (network client, WWW browser, terminal

		emulation, file transfer).
	05.22	Install and configure client software for client/server and network-based applications (e-mail, videoconferencing, database).
	05.23	Install internetworking applications on a server and configure clients for network access.
	05.24	Describe the major functions of network client software components.
	05.25	Install and configure client software on multiple hardware platforms.
	05.26	Install and configure drivers for NICs and network peripherals (including printers).
	05.27	Configure the client to support multiple protocols.
	05.28	Install and configure client/server applications such as e-mail, scheduling on a server.
	05.29	Install and configure network-based services such as videoconferencing, integrated voicemail/email/fax, large document storage and retrieval.
06.0	Perform enterprise architecture-related tasks. – The student will be able to:	
	06.01	Describe the Human-Computer Interaction (HCI) factors that impact the design of a Web page and Web site.
	06.02	Determine the purpose of establishing an Internet site.
	06.03	Identify the intended audience that will access the Internet site.
	06.04	Determine user needs including secondary applications including database needs and select appropriate applications.
	06.05	Identify business processes to be automated.
	06.06	Determine client specifications.
	06.07	Determine design standards based on intended audience.
	06.08	Formulate architecture including bandwidth specifications.
	06.09	Establish performance standards and set baseline.
	06.10	Determine security standards that will meet business requirements.
	06.11	Install and configure system based on planning.
07.0	Perform web design/development activities. – The student will be able to:	
	07.01	Describe and use the process of storyboarding a Web site.
	07.02	Describe format, structure and design principles for Web sites.

07.03	Evaluate Web graphic utilities and creation tools, including those for animated graphics.
07.04	Identify existing resources and constraints.
07.05	Evaluate design based on current industry and in-house standards.
07.06	Create site navigation plan including directory structure.
07.07	Procure and incorporate standard and animated graphics into a Web page.
07.08	Obtain in-house content and determine needs for secondary content providers.
07.09	Design page templates to implement on final site.
07.10	Create a Web page using authoring tools.
07.11	Code page(s) using current Web programming languages.
07.12	Check page for cross-browser capability and other access issues.
07.13	Upload pages and run site analysis.
07.14	Incorporate sound files onto a Web page.
07.15	Incorporate a streaming video file onto a Web page.
07.16	Incorporate a video file for download into a Web page.
07.17	Create an animated graphic.
07.18	Perform simple graphic modifications using a graphics utility.
07.19	Create virtual Web pages using a virtual reality modeling language.
07.20	Incorporate an e-mail link on a Web page.
07.21	Incorporate internal and external links on a Web page.
07.22	Incorporate frames, tables, and file transfer capabilities on a Web page.
07.23	Incorporate handicapped-accessibility options into the Web site.
07.24	Set up and configure a search engine for a Web site.
07.25	Create a Web form and produce e-mail results.
07.26	Create a Web database interface.
07.27	Discuss the issue of ODBC compliance.

08.0	Perform programming and scripting activities. – The student will be able to:
08.01	Identify several of the most prominent current programming languages.
08.02	Characterize the stages of the system development life cycle.
08.03	Differentiate between two common strategies for problem solving.
08.04	Describe the program design and development process.
08.05	Differentiate between structured programming and object-oriented programming.
08.06	Use procedural and object-oriented constructs of programming, scripting, and/or macro languages to create and test programs including batch files and menu programs.
08.07	Apply principles of good design and documentation when developing programs.
08.08	Write scripting code to handle error checking in client forms.
08.09	Write CGI programs to allow for interactions between the client and server.
08.10	Write Java applets.
08.11	Identify development tools and list in order of complexity of use.
08.12	Review design specifications.
08.13	Design and test algorithms.
08.14	Write program according to specs.
08.15	Test and debug code.
08.16	Revise code based on testing procedures.
09.0	Perform testing/troubleshooting activities. – The student will be able to:
09.01	Describe the use of diagnostic test equipment.
09.02	Describe features of diagnostic software.
09.03	Use system, software, and network documentation.
09.04	Locate and use online documentation resources.
09.05	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
09.06	Recognize and resolve basic hardware, software configuration, and peripheral device problems.

	09.07	Use effective troubleshooting strategies and techniques to resolve network problems, including network interfaces, cabling, or other network components (hubs, switches).
	09.08	Describe handicapped-accessibility features for a Web site.
	09.09	Describe appropriate procedures and techniques for disaster prevention and recovery (surge suppressors, UPS, use of anti-virus software, replacement equipment plans, backups of software and data, offsite storage of backup media).
	09.10	Describe appropriate security procedures and practices, including physical security and protection of resources through software measures (passwords, antivirus software, data encryption).
	09.11	Develop testing plan and procedures.
	09.12	Develop a system baseline.
	09.13	Perform capacity testing against system baseline.
	09.14	Evaluate network performance based on test outcomes.
	09.15	Evaluate database performance based on test outcomes.
	09.16	Evaluate server performance based on test outcomes.
	09.17	Evaluate client performance based on test outcomes.
	09.18	Identify bottlenecks and create a plan to improve throughput.
	09.19	Optimize system based on total system evaluation.
	09.20	Assess accessibility standards.
	09.21	Evaluate security system.
	09.22	Conduct ongoing systems analysis.
	09.23	Revise system as required.
	09.24	Obtain final client approval for implementation and system changes.
10.0	Perform security activities. – The student will be able to:	
	10.01	Complete a security needs evaluation.
	10.02	Design security architecture.
	10.03	Select security protocol.
	10.04	Select and set encryption methodology.

	10.05 Incorporate password protection on a Web page.
	10.06 Incorporate Internet cookies into a Web page.
	10.07 Configure firewall.
11.0	Perform web site management activities. – The student will be able to:
	11.01 Describe the process of obtaining an Internet domain address.
	11.02 Register an Internet site.
	11.03 Notify appropriate external search engines of the Web site.
	11.04 Compare features of currently available site management tools.
	11.05 Install and configure Web site management software.
	11.06 Create and maintain a Web site using a Web management tool.
	11.07 Implement appropriate Web site security measures.
	11.08 Use and evaluate the results of a Web site visit-recording tool.
12.0	Perform e-commerce-related tasks. – The student will be able to:
	12.01 Describe Web e-commerce.
	12.02 Analyze e-commerce models.
	12.03 Develop an e-commerce business plan.
	12.04 Develop e-commerce marketing plan.
	12.05 Identify components and procedures necessary to process credit card transactions.
	12.06 Integrate credit card transaction process.
	12.07 Implement shopping cart software.
	12.08 Set up and configure online catalog to market products.
	12.09 Establish transaction storage and reporting system.
	12.10 Publish web site.

13.0	Perform quantitative analysis activities. – The student will be able to:
13.01	Determine type/tools available for analysis.
13.02	Determine traffic patterns.
13.03	Gather user data.
13.04	Analyze data.
13.05	Make recommendations for site improvements.
14.0	Demonstrate professional development skills. – The student will be able to:
14.01	Identify corporate strategies and policies.
14.02	Maintain professional contact for future projects.
14.03	Build mentor relationships.
14.04	Anticipate future industry trends.
14.05	Continue education.
14.06	Review and analyze other industry productions.
14.07	Use and experiment with the technology.
14.08	Network with local professionals in the industry.
14.09	Read industry journals and magazines.
14.10	Attend seminars, workshops, and tradeshows.
15.0	Perform Documentation and Technical reference activities. – The student will be able to:
15.01	Use technical vocabulary appropriately.
15.02	Locate information in technical references.
15.03	Prepare technical reports.
15.04	Describe appropriate documentation procedures and practices.
15.05	Effectively use locally maintained systems, software, and network documentation.
15.06	Produce and maintain system documentation, such as inventory, costs, installed software, and procedures.

15.07	Perform Documentation and Technical reference activities.
15.08	Understand, Install and configure computer hardware.
15.09	Understand, Install and configure computer software.
15.10	Perform Troubleshooting activities.
15.11	Demonstrate understanding of networked environments.
15.12	Demonstrate proficiency with Internet structure, organization, and navigation.
15.13	Maintain visual network documentation, such as cabling diagrams.
15.14	Describe effective strategies for online research.
15.15	Locate technical information online.
15.16	Evaluate information located through online research.
15.17	Cite correctly Internet-based resources.
16.0	Demonstrate employment skills. – The student will be able to:
16.01	Identify appropriate attire and grooming for a business office.
16.02	Identify sources of employment opportunities.
16.03	Discuss employer expectations regarding attendance, punctuality, initiative and teamwork.
16.04	Discuss employee rights regarding privacy, discrimination, due process and safety.
16.05	Explain the importance of having a written job description.
16.06	List representative jobs and career paths for people trained in the computer networking support area.
16.07	List several functions of each representative computer service oriented job and career path.
16.08	Complete employment forms.
16.09	Classify behaviors considered to be appropriate or inappropriate in a job interview situation.
16.10	Compose and type a follow-up letter.
16.11	Compose and type a letter of application and a resume.
16.12	Compose and type a letter of resignation.

16.13	Demonstrate job interview skills.
16.14	Identify methods for securing an employment reference.
17.0	Perform general organizational computing workplace competencies. – The student will be able to:
17.01	Follow oral and written instructions.
17.02	Prepare, outline, and deliver a short oral presentation.
17.03	Participate in group discussion as a member and as a leader.
17.04	Obtain appropriate information form graphics, maps, or signs.
17.05	Prepare visual material to support an oral presentation.
17.06	Demonstrate self-motivation and responsibility to complete an assigned task.
17.07	List the steps in problem solving.
17.08	Choose appropriate action in situations requiring effective time management.
17.09	Identify and discuss issues contained within professional codes of conduct.
17.10	Identify and discuss software licensing issues.
17.11	Identify and discuss property rights and licensing issues.
17.12	Identify and discuss privacy issues.
17.13	Identify and discuss encryption issues.
17.14	Identify legal liability issues.
17.15	Describe appropriate measures for planning and managing a large project.
17.16	Define an implementation schedule for a large project.
17.17	Describe appropriate measures for planning and implementing corporate wide upgrade of hardware and software.
17.18	Identify potential sources of employee/employer or employee/employer conflict and discuss possible approaches to resolve such disagreements.
17.19	Use appropriate communication skills, courtesy, manners, and dress in the workplace.
17.20	Apply principles and techniques for being a productive, contributing member of a team.
17.21	Identify and use acceptable strategies for resolving conflict in the workplace.

17.22	Apply principles and techniques for working productively with people of diverse cultures and backgrounds.
17.23	Identify techniques for stress management and prevention of job burn-out.
17.24	Use appropriate communication skills, telephone etiquette, courtesy, and manners when dealing with customers.
17.25	Communicate effectively with individuals lacking a technical background.
17.26	Identify clear detailed technical oral instructions.
17.27	Identify examples of effective end-user training strategies and techniques.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following PSAV programs have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

Web Design (B070500) – 9 credits
Web Programming Services (B079200) – 9 credits

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

Adobe Certified Associate - Dreamweaver (ADOBE010) – 3 credits
Adobe Certified Associate - Flash (ADOBE011) – 3 credits
Certified Internet Web (CIW) – Associate Design Specialist (PROSO001) – 6 credits
Certified Internet Web (CIW) – Master Designer (PROSO004) – 6 credits
Microsoft Certified Professional Developer (MCPD) – ASP.NET Developer (MICRO062) – 3 credits
Microsoft Certified Professional Developer (MCPD) – Web Developer (MICRO043) – 3 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp .

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 63 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Information Technology Administration (0511010307) – 18 credit hours
Web Development Specialist (0511080103) – 35/36 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Network Systems Technology**
Career Cluster: **Information Technology**

NOTE: This program has been daggered for deletion with 2016-2017 being the last cohort of students permitted to enroll in the program. After 2016-2017, no new students may be enrolled in this program. Students already enrolled in the program may, at the college's discretion, continue taking courses in the program until completion. Network Systems Technology 60 1511100112 will replace this program.

AS	
CIP Number	1511100111
Program Type	College Credit
Standard Length	63 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts 15-1142 – Network and Computer Systems Administrators 15-1152 – Computer Network Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as cabling specialists, network control operators, data communications analysts, network technicians, computer security specialists, network specialists, network managers, network systems analysts, network systems technicians, network troubleshooters, WAN/LAN managers, or systems administrators in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to planning, installing, configuring, monitoring, troubleshooting, and managing computer networks in a LAN/WAN environment. Students will be prepared to apply conceptual, theoretical and practical knowledge to the workplace utilizing technical skills learned during the program.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of core standards and eight different tracts to permit students to specialize in network administration, network infrastructure, network virtualization, network security/cybersecurity, IP communications, digital forensics, advanced network infrastructure. Or UNIX Linux system administrator. Standards comprising each specialization area are completed in addition to the core standards. Due to the foundational nature of the core, it is recommended that students complete the core, or demonstrate a mastery of the student performance standards contained in the core, before advancing to courses comprising a specialization tract. Standards in the core prepare students with requisite foundational knowledge and skills related to computer maintenance and support, networking fundamentals, operating systems, network security, technical communications, and project management. The total Associate in Science degree program consists of 63 credit hours.

In addition, students will complete the standards in one of the following specializations:

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency in basic computer network maintenance and support.
02.0 Demonstrate a fundamental understanding of computer networking.
03.0 Demonstrate an understanding of common operating system concepts and associated practices.
04.0 Demonstrate fundamental proficiency in network security essentials.
05.0 Demonstrate proficiency in technical communications and workplace protocols.
06.0 Demonstrate a basic understanding of project management concepts and processes.
07.0 Demonstrate workplace-readiness skills.

In addition, students will complete the standards in one of the following specializations:

Network Administration Specialization Standards

08.0 Demonstrate an understanding of the directory infrastructure and installation.
09.0 Demonstrate an understanding of group policy.
10.0 Demonstrate an understanding of implementing sites to manage Active Directory replication.
11.0 Demonstrate an understanding of maintaining directory availability.
12.0 Demonstrate how to install and deploy a server operating system.
13.0 Demonstrate how to provide infrastructure services.
14.0 Demonstrate how to provide file and print services.
15.0 Demonstrate how to provide remote and wireless network access.
16.0 Demonstrate how to monitor and maintain network servers and services.
17.0 Demonstrate an understanding of securing data transmission and authentication.
18.0 Demonstrate an understanding of planning for business continuity and high availability.
19.0 Demonstrate workplace-readiness skills.

Network Infrastructure Specialization Standards

08.0 Demonstrate understanding of routing concepts.
09.0 Demonstrate understanding of routing protocols.
10.0 Demonstrate router configuration skills.
11.0 Demonstrate an understanding of LAN design and concepts.
12.0 Demonstrate VLAN configuration skills.
13.0 Demonstrate an understanding of basic wireless concepts and configuration.
14.0 Demonstrate an understanding of wide area networks (WAN).
15.0 Demonstrate WAN configuration skills.
16.0 Demonstrate an understanding of network security.

17.0 Demonstrate an understanding of remote access.
18.0 Demonstrate an understanding of IP addressing services.
19.0 Demonstrate an understanding of network maintenance, support and troubleshooting.

Network Security/Cybersecurity Specialization Standards

08.0 Demonstrate proficiency in securing network infrastructures and protecting data.
09.0 Demonstrate proficiency in performing security penetration testing.
10.0 Demonstrate proficiency in responding to cybersecurity incidents.

Network Virtualization Specialization Standards

08.0 Demonstrate an understanding of virtualization concepts.
09.0 Install and configure the virtualization server platform.
10.0 Install, configure and manage virtualized clients.
11.0 Install, configure, test, and monitor virtualized applications.
12.0 Demonstrate proficiency in managing a virtualization infrastructure.

Digital Forensics Specialization Standards

08.0 Demonstrate proficiency in basic and advanced security concepts.
09.0 Demonstrate proficiency in managing hardware involved in imaging and data collection activities.
10.0 Demonstrate proficiency in analyzing common file systems.
11.0 Demonstrate proficiency in performing computer forensics investigations.
12.0 Demonstrate proficiency in performing mobile device forensics.
13.0 Demonstrate proficiency in incident handling and response.
14.0 Identify key pieces of legislation and processes related to digital forensics.
15.0 Demonstrate an understanding of the tasks related to the casework process.

IP Communications Specialization Standards

08.0 Demonstrate an understanding of IP Communication theory.
09.0 Demonstrate an understanding of digitizing voice traffic and voice compression standards.
10.0 Demonstrate an understanding of quality of service (QoS) requirements in a converged data and voice network.
11.0 Demonstrate an understanding of IP communications design.
12.0 Demonstrate an understanding of troubleshooting procedures for IP communications.
13.0 Demonstrate an understanding of utilizing advanced Voice over IP (VoIP) and Data Bundle solutions to provide a single network connection for phone services and high-speed Internet.
14.0 Demonstrate an understanding of using Statistical Analysis System (SAS) sessions to exchange data by using the TCP/IP communications access method.
15.0 Demonstrate how to configure VoIP fax applications for universal access servers.

16.0 Demonstrate an understanding of key concepts for Video over IP.

Advanced Network Infrastructure Specialization Standards

08.0 Demonstrate an understanding of routing concepts.
09.0 Demonstrate an understanding of routing protocols.
10.0 Demonstrate router configuration skills.
11.0 Demonstrate an understanding of LAN design and concepts.
12.0 Demonstrate VLAN configuration skills.
13.0 Demonstrate an understanding of basic wireless concepts and configuration.
14.0 Demonstrate an understanding of wide area networks (WAN).
15.0 Demonstrate Wide Area Network configuration skills.
16.0 Demonstrate an understanding of network security.
17.0 Demonstrate an understanding of remote access.
18.0 Demonstrate an understanding of IP addressing services.
19.0 Demonstrate an understanding of network maintenance, support and troubleshooting.

Linux System Administrator Specialization Standards

08.0 Understand and use essential tools.
09.0 Operate running systems.
10.0 Configure local storage.
11.0 Create and configure file systems.
12.0 Deploy, configure, and maintain systems.
13.0 Manage users and groups.
14.0 Manage security.

Florida Department of Education
Student Performance Standards

Program Title: **Network Systems Technology**
CIP Number: **1511100111**
Program Length: **63 credit hours**
SOC Code(s): **15-1122, 15-1142, 15-1152**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic computer network maintenance and support. – The student will be able to:
01.01	Describe the main computer components and their functions.
01.02	Describe the operation of computer systems, including input and output systems, file systems, device management, program loading and execution and data storage.
01.03	Demonstrate the safe and ethical use of computers.
01.04	Demonstrate proficiency in connecting to and safely using the Internet.
01.05	Describe emerging computer technologies and discuss their potential impact.
01.06	Implement proper procedures for handling and safeguarding equipment.
01.07	Describe procedures for proper disposal of computer components.
01.08	Install, configure, maintain and secure computer systems and peripherals following institutional protocol.
01.09	Configure and update firmware and ROM-BIOS.
01.10	Implement work order procedures.
01.11	Design and implement systems redundancy and data backups.
01.12	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
01.13	List the steps in problem solving.
01.14	Recognize and resolve basic computer configuration problems.

02.0	Demonstrate a fundamental understanding of computer networking. – The student will be able to:
02.01	Explain the use of binary numbers and perform binary arithmetic.
02.02	Describe current network environments.
02.03	Describe network communications and architecture.
02.04	Identify network components, media, connectors, applications and protocols.
02.05	Compare and contrast the OSI and TCP/IP reference models and their layers.
02.06	Identify and describe current relevant IEEE network standards.
02.07	Create an IP addressing scheme using Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
02.08	Identify and discuss issues related to networked environments, such as security, access control, fair use, privacy and redundancy.
02.09	Identify and discuss issues related to naming conventions for user IDs, email, passwords, and network hosts and devices.
02.10	Identify standard network topologies and describe the advantages and disadvantages of each topology.
02.11	Describe the major functions of LAN protocols.
02.12	Explain the functions of wireless components, standards, hardware, software, and infrastructure design.
02.13	Configure and manage the TCP/IP protocol stack.
02.14	Describe how TCP and UDP Port addresses, IP addresses, and MAC addresses function, and how they are used to deliver data across the network.
02.15	Identify emerging technologies and discuss related technical issues.
02.16	Design a local area network (LAN), including the specification of architecture, hardware and software.
02.17	Identify the advantages and use of virtual local area networks (VLANs).
02.18	Identify and explain wide area network (WAN) concepts.
02.19	Plan, configure and test a small network and establish baselines.
02.20	Describe the major functions of network server software components.
02.21	Install applications on a server and configure clients for network access.

03.0	Demonstrate an understanding of common operating system concepts and associated practices. – The student will be able to:
03.01	Describe the components and functions of major operating systems.
03.02	Compare and contrast major functions and features of current network operating systems (including directory services).
03.03	Install, configure and update client and server operating systems.
03.04	Describe the purpose and uses of computer virtualization.
03.05	Manage device drivers and software for peripheral devices.
03.06	Manage the network and firewall settings of a client.
03.07	Use an operating system for activities such as data and file management.
03.08	Identify current systems utilities and describe their functions.
03.09	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.10	Create, use, maintain, backup and restore system configuration files.
03.11	Describe procedures for uninstalling operating system software.
03.12	Install and configure client software for connecting to LANs, WANs, and the Internet.
03.13	Demonstrate knowledge of basic troubleshooting methodology.
04.0	Demonstrate fundamental proficiency in network security essentials. – The student will be able to:
04.01	Describe common security threats to, and vulnerabilities of, computer systems and the corresponding best practices for mitigation.
04.02	Define and describe malicious software and techniques to protect systems from its effects.
04.03	Describe Denial of Service attacks and means to defend against them.
04.04	Identify the risks and techniques of data loss and its prevention.
04.05	Describe the principles and techniques of securing data storage and transmission.
04.06	Identify current encryption and authentication standards.
04.07	Implement security policies, including compliance and operational security.
04.08	Enable access control, identity management and security logging.

04.09	Manage client and network system security software and related updates.
04.10	Describe the functions and characteristics of firewalls.
04.11	Perform a ping sweep to identify network hosts.
04.12	Perform a port scan to probe network hosts for open TCP and UDP ports.
04.13	Describe the purpose and operation of network protocol analyzers.
04.14	Utilize a network protocol analyzer to capture and analyze network traffic for security issues.
05.0	Demonstrate proficiency in technical communications and workplace protocols. – The student will be able to:
05.01	Identify issues in the communication of technical information to a non-technical audience.
05.02	Create, utilize, and maintain system documentation.
05.03	Utilize online resources to locate and evaluate technical information and documentation.
05.04	Identify and discuss issues contained within professional codes of conduct.
05.05	Prepare and deliver a technical presentation.
05.06	Create and interpret technical and business communications.
05.07	Demonstrate the basic principles of teamwork and the techniques for being a productive and effective contributing member of a team.
05.08	Identify and use acceptable strategies for resolving conflicts in the workplace.
05.09	Deliver and follow oral and written technical instructions.
05.10	Describe the roles of the network specialist in a business enterprise.
05.11	Document problems and solutions in service reports and maintain proper documentation.
05.12	Perform research on technical issues using Internet and database resources.
06.0	Demonstrate a basic understanding of project management concepts and processes. – The student will be able to:
06.01	Examine the organization, planning, and controlling of projects.
06.02	Define Project Integration Management.
06.03	Describe project phases, process groups, and the full project life cycle.

06.04	Choose appropriate actions in situations that require effective time management. Understand the basic tools and techniques to plan, organize, and manage a project.
06.05	Describe a project life cycle from initiation to planning through execution, acceptance, support, quality, budgeting, and closure.
06.06	Understand the factors contributing to risk management planning.
06.07	Understand the project environment including: cultural, social, international, political and physical.
06.08	Describe the principles of identifying, developing, and managing resources.
06.09	Plan and monitor a project budget and schedule using project management tools.
06.10	Understand the technical and human aspects of project control, especially change control.
06.11	Describe the basic tools and techniques of managing project quality and risk.
06.12	Understand the contextual relationship between the project and the organization that hosts the project.
06.13	Demonstrate an understanding of the importance of working in teams, managing team members, and interacting with stakeholders.
06.14	Understand the importance of ethical considerations in every aspect of a project's operation.
07.0	Demonstrate workplace-readiness skills. – The student will be able to:
07.01	Understand the value of proper communication in the classroom and workplace environment. Follow oral and written instructions.
07.02	Participate in group discussions as a member and as a leader.
07.03	Understand the importance of self-motivation and responsibility in completing assigned tasks.
07.04	Choose appropriate actions in situations requiring effective time management.
07.05	Apply principles and techniques for being a productive, contributing member of a team.
07.06	Discuss the ethical aspects of intellectual property rights and licensing issues.
07.07	Identify and discuss issues contained within professional codes of conduct.
07.08	Use appropriate communication skills, courtesy, manners, and dress in the workplace.

Network Administration Specialization Standards	
08.0	Demonstrate an understanding of the directory services infrastructure and installation. – The student will be able to:
08.01	Describe the architecture of Active Directory.
08.02	Discuss how Active Directory works.
08.03	Describe the Active Directory design, plan, and implementation processes.
08.04	Create a forest and domain structure.
08.05	Configure the Domain Name Service (DNS) in an Active Directory environment.
08.06	Raise the functional level of a forest and a domain.
08.07	Create trust relationships between domains.
08.08	Create, manage, and delegate administrative control for organizational units.
09.0	Demonstrate an understanding of organizational units and related objects. – The student will be able to:
09.01	Discuss user, group, and computer accounts.
09.02	Create and manage multiple accounts.
09.03	Implement user principal name suffixes.
09.04	Move objects in Active Directory.
09.05	Plan an account strategy.
09.06	Plan an Active Directory audit strategy.
10.0	Demonstrate an understanding of group policy. – The student will be able to:
10.01	Create and configure group policy objects (GPOs).
10.02	Configure group policy refresh rates and group policy settings.
10.03	Manage GPOs.
10.04	Verify and troubleshoot group policy.
10.05	Delegate administrative control of group policy.

	10.06 Plan a group policy strategy for the enterprise.
	10.07 Configure, deploy and maintain applications using group policy, System Center tools and Terminal Services.
	10.08 Monitor and maintain security policies.
	10.09 Prepare and implement group policy strategy and backup/recovery of group policy objects.
11.0	Demonstrate an understanding of implementing sites to manage Active Directory replication. – The student will be able to:
	11.01 Discuss directory services replication.
	11.02 Design and document site topology.
	11.03 Manage site topology.
	11.04 Troubleshoot replication failures.
	11.05 Plan, create and configure a site.
	11.06 Implement the global catalog in Active Directory.
	11.07 Plan and determine the placement and type of domain controllers in Active Directory.
	11.08 Identify the various Operations Master Roles.
	11.09 Plan the placement of Operations Masters.
	11.10 Transfer and seize Operations Master Roles.
12.0	Demonstrate an understanding of maintaining Active Directory services availability. – The student will be able to:
	12.01 Create an Active Directory implementation plan for a business enterprise.
	12.02 Implement the Active Directory infrastructure for a business enterprise.
	12.03 Describe the maintenance of the Active Directory.
	12.04 Move and defragment an Active Directory database.
	12.05 Back up and restore a Active Directory.
	12.06 Monitor an Active Directory.

13.0	Demonstrate how to install and deploy a server operating system. – The student will be able to:
13.01	Identify server operating system (OS) versions, editions, features and capabilities.
13.02	Assess server installation readiness by inventorying hardware.
13.03	Describe the methods, options and requirements for a Windows server installation and upgrade.
13.04	Perform an attended and an unattended OS installation.
13.05	Configure basic network settings.
13.06	Configure storage.
13.07	Configure operating systems licensing.
13.08	Describe, identify and choose server roles and role services.
13.09	Perform a system review and troubleshoot installation issues.
13.10	Document the system installation.
13.11	Automate server deployments using unattended installation tools and Windows.
13.12	Implement deployment services.
14.0	Demonstrate how to provide infrastructure services. – The student will be able to:
14.01	Describe the purpose and function of Dynamic Host Configuration Protocol (DHCP).
14.02	Install, configure, and authorize the DHCP server role.
14.03	Manage, backup and restore the DHCP Database.
14.04	Configure the DHCP Relay Agent.
14.05	Describe the DNS name resolution process.
14.06	Configure DNS zones, records and replication.
14.07	Integrate DNS servers with Active Directory.
14.08	Configure name resolution for client computers.

15.0	Demonstrate how to provide file and print services. – The student will be able to:
15.01	Design a file sharing strategy.
15.02	Install the file and print server roles and services.
15.03	Manage file sharing security, encryption, redundancy, and offline access.
15.04	Manage disk quotas, file screening and shadow copy services.
15.05	Backup and restore files.
15.06	Configure Distributed File System (DFS) roots, targets and replication.
15.07	Identify and install print drivers.
15.08	Manage printer security, priorities, schedules and pools.
15.09	Publish printers and file shares to Active Directory.
15.10	Monitor and troubleshoot print and file services.
16.0	Demonstrate how to provide remote and wireless network access. – The student will be able to:
16.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
16.02	Configure static and dynamic routing, Network Address Translation (NAT) and Internet Connection Sharing (ICS).
16.03	Configure remote access services, protocols and policies, conditions and settings.
16.04	Configure Remote Access Dial-In User Service (RADIUS).
16.05	Configure wireless clients with group policy.
16.06	Monitor and troubleshoot remote access and wireless connections.
17.0	Demonstrate how to monitor and maintain network servers and services. – The student will be able to:
17.01	Monitor and compare network and server performance data to establish and document baselines, isolate problems and optimize performance, adaptability, and scalability.
17.02	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.
17.03	Monitor event logs for information, errors and warnings.
17.04	Maintain system documentation and service histories.

	17.05 Configure server and client settings to implement patch management strategy.
	17.06 Develop strategies for remote server management using command-line and GUI tools.
18.0	Demonstrate an understanding of securing data transmission and authentication. – The student will be able to:
	18.01 Explain the social, ethical and technical issues regarding data integrity and confidentiality.
	18.02 Secure network traffic using IPSec.
	18.03 Configure network authentication.
	18.04 Install, configure and manage certificate services.
	18.05 Describe and deploy a network access protection strategy.
	18.06 Configure firewall settings.
	18.07 Identify ports and protocols and create filters for incoming and outgoing traffic.
19.0	Demonstrate an understanding of planning for business continuity and high availability. – The student will be able to:
	19.01 Discuss virtualization architectures.
	19.02 Estimate data storage requirements.
	19.03 Select a storage technology.
	19.04 Plan for storage fault tolerance.
	19.05 Develop strategies to ensure application and service availability.
	19.06 Plan for backup and recovery of data, servers, and directory services.

Network Infrastructure Specialization Standards	
08.0	Demonstrate an understanding of routing concepts. – The student will be able to:
08.01	Describe the purpose, architecture, and operations of a router.
08.02	Identify the hardware and software components of routers.
08.03	Explain the purpose and nature of routing tables.
08.04	Describe administrative distance and routing metrics such as hop counts and cost.
08.05	Describe how a router determines a path and switches packets.
08.06	Differentiate between static and dynamic routing.
08.07	Explain the differences between class-full and classless routing.
08.08	Describe the use and operation of VLSM and CIDR.
08.09	Describe how a network converges.
09.0	Demonstrate an understanding of routing protocols. – The student will be able to:
09.01	Describe the characteristics of distance vector routing protocols.
09.02	Describe the characteristics of link state routing protocols.
09.03	Describe the differences between distance vector and link state routing protocols and determine the best routing protocol to use in a given situation.
09.04	Describe the features and operation of current internal and external routing protocols.
10.0	Demonstrate router configuration skills. – The student will be able to:
10.01	Configure and verify router interfaces.
10.02	Perform basic router configuration using the Command Line Interface (CLI) to inspect the operations of the router.
10.03	Design and implement a classless IP addressing scheme for a network.
10.04	Configure a router for RIP version 2 operation.
10.05	Use advanced configuration commands with routers.
10.06	Configure a router for OSPF routing in a network.

10.07	Fine-tune OSPF settings on a router, including the configuration of reference bandwidth, redistribution of static and default routes, and modification of OSPF intervals, in order to optimize network performance.
10.08	Verify and troubleshoot router operations in an OSPF network.
10.09	Configure and modify metric on a router to improve network performance.
10.10	Configure summarization and default route settings on a router to optimize network performance.
10.11	Verify and troubleshoot router operations in complex network environment.
11.0	Demonstrate an understanding of LAN design and concepts. – The student will be able to:
11.01	Identify the layers and functions of switched network architecture.
11.02	Describe the principles and benefits of a hierarchical network design.
11.03	Explain the technology and media access control method for Ethernet networks.
11.04	Describe the issues associated with Layer 2.
11.05	Describe the operation of a LAN switch.
11.06	Describe the benefits of Virtual Local Area Networks (VLAN).
11.07	Identify and describe the different VLAN encapsulation protocols and their operation.
11.08	Describe the purpose and operation of VLAN Trunking Protocol (VTP) in the management of a switched network domain.
11.09	Describe the purpose and operation of Spanning Tree Protocol (STP), and its variants.
11.10	Describe the use of Inter-VLAN routing to connect different Networks in a switch-based network topology.
11.11	Analyze business requirements and design a LAN structure to meet those requirements.
11.12	Discuss quality-of-service considerations and switching prioritization.
12.0	Demonstrate VLAN configuration skills. – The student will be able to:
12.01	Perform and verify initial LAN switch configuration tasks including remote access management, switch port modes, and trunks.
12.02	Configure, verify, and troubleshoot VLANs on a LAN switch.
12.03	Implement a VLAN Domain by configuring LAN switches for VTP network operation.
12.04	Configure a router to provide Inter-VLAN routing using multiple physical interfaces, and on a single physical interface with sub-interfaces.

12.05	Configure and troubleshoot STP and its variants on a switched network environment.
12.06	Configure and verify the bridge to optimize STP.
12.07	Establish and configure port priorities.
12.08	Troubleshoot and resolve issues with STP operations.
12.09	Manage router and switch OS software.
13.0	Demonstrate an understanding of basic wireless concepts and configuration. – The student will be able to:
13.01	Describe standards associated with wireless media, including IEEE, Wi-Fi Alliance, and ITU/FCC standards.
13.02	Identify and describe the purpose of the components in a small wireless network such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS).
13.03	Perform a site survey and identify common implementation issues.
13.04	Identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points.
13.05	Configure and verify WLAN design and functionality.
13.06	Describe and configure wireless security, including Wi-Fi Protected Access (WPA).
13.07	Describe and troubleshoot common wireless-network implementation issues such as interference and misconfiguration.
14.0	Demonstrate an understanding of wide area networks (WAN). – The student will be able to:
14.01	Describe WAN and MAN topologies.
14.02	Differentiate between WAN and LAN topologies.
14.03	Identify and describe WAN protocols.
14.04	Describe the impact of applications (Voice Over IP, Video Over IP) on a network.
14.05	Identify major network issues associated with the Internet, intranets and extranets.
14.06	Explain the differences between the use of leased lines, packet-switched, and circuit-switched technologies.
14.07	Describe typical WAN links and discuss bandwidth considerations.
14.08	Identify and manage licensing.

15.0	Demonstrate WAN configuration skills. – The student will be able to:
15.01	Configure and verify Point-to-Point WAN connection.
15.02	Configure and verify a packet switched WAN connection.
15.03	Configure and verify a basic WAN serial connection, a PPP connection between routers, and Frame Relay.
15.04	Configure and verify a PPP connection between routers, and verify a Frame Relay between routers.
15.05	Troubleshoot WAN implementation issue.
15.06	Implement LAN/WAN connections, including virtual private networks (VPN), permanent virtual circuits (PVC), Frame Relay, tunneling, remote and mobile user access.
16.0	Demonstrate an understanding of network security. – The student will be able to:
16.01	Implement basic switch security measures such as port security, trunk access, and management VLANs.
16.02	Identify current network security threats and explaining how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications.
16.03	Describe the functions of common security appliances and applications.
16.04	Implement recommended security practices to secure network devices.
16.05	Discuss the functions of authentication servers.
16.06	Describe the function and use of Access Control Lists (ACLs).
16.07	Verify, monitor, and troubleshoot ACLs in a network environment.
17.0	Demonstrate an understanding of remote access. – The student will be able to:
17.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
17.02	Configure static and dynamic routing, Network Address Translation (NAT) and Internet Connection Sharing (ICS).
17.03	Configure remote access services, protocols and policies, conditions and settings.
17.04	Configure remote access Dial-In User Service (RADIUS).
17.05	Configure wireless clients with group policy.
17.06	Monitor and troubleshoot remote access and wireless connections.

18.0	Demonstrate an understanding of IP addressing services. – The student will be able to:
18.01	Describe the purpose and operation of DHCP and DNS in a networked environment.
18.02	Configure, verify, and troubleshoot DHCP and DNS operation on a router.
18.03	Describe the operation and use of NAT and Port Address Translation (PAT) to provide Internet access to Private IP Address networks.
18.04	Configure, verify, and troubleshoot NAT on a router, including static translation, use of IP Address pools, and sharing a public IP address on a router interface.
18.05	Describe the purpose and operation of IPv6.
18.06	Configure, verify, and troubleshoot IPv6 routing in a network.
19.0	Demonstrate an understanding of network maintenance, support and troubleshooting. – The student will be able to:
19.01	Identify, interpret and maintain network documentation, procedures and practices.
19.02	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
19.03	Follow standard operating procedures for troubleshooting hardware and software.
19.04	Manage, maintain and backup router and switch system and configuration files.
19.05	Recognize and resolve hardware and software configuration problems.
19.06	Identify and resolve common network problems at Layers 1, 2, 3, and 7 using a layered model approach. Describe the use and features of diagnostic test equipment.
19.07	Determine type of programs and procedures required to: baseline network performance, identify intrusion and unacceptable system use, identify performance issues, predict system failures, and optimize network availability.
19.08	Use network monitoring and management tools effectively to integrate and manage network resources.
19.09	Explain RMON and SNMP and their use in monitoring a network.
19.10	Configure network devices to send SNMP traps or alerts to network management systems.
19.11	Establish and document a network baseline.
19.12	Compare and analyze initial performance measurements with the availability of critical network devices and connections to determine the difference between abnormal behavior and proper network performance as the network grows or traffic patterns change.
19.13	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.

Network Security/Cybersecurity Specialization Standards	
08.0	Demonstrate proficiency in securing network infrastructures and protecting data. – The student will be able to:
08.01	Explain the major categories of computer crimes and attacks.
08.02	Identify vulnerabilities inherent in network devices, protocols and services.
08.03	Develop institutional security policies and practices in compliance with relevant governmental standards and regulations.
08.04	Implement protective measures in securing critical information assets.
08.05	Deploy various network security related equipment including, firewalls, intrusion prevention systems, and proxies.
08.06	Secure critical network services such as Directory Services, Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), and File Transfer Protocol (FTP).
08.07	Secure desktop client operating systems against viruses, malware and other malicious attacks.
08.08	Detect malicious and abnormal activities through logs, intrusion detection systems and other utilities and appliances.
09.0	Demonstrate proficiency in performing security penetration testing. – The student will be able to:
09.01	Assist an organization in evaluating their current security posture by identifying gaps in security.
09.02	Identify organizational compliance with regulatory and legislative Information Assurance (IA) requirements.
09.03	Identify physical and logical weaknesses in computers and networks as well as physical weaknesses and weaknesses in policies, procedures and practices relating to the network and the organization.
09.04	Test the network perimeter defense mechanisms to ensure safe cyber boundaries.
09.05	Simulate methods that intruders use to gain unauthorized access to an organization's networked systems and attempted to compromise them.
09.06	Deploy proprietary and/or open source tools to test known technical vulnerabilities in networked systems.
09.07	Determine which vulnerabilities are exploitable and the degree of information exposure or network control that the organization could expect an attacker to achieve after successfully exploiting vulnerability.
09.08	Recommend procedures to mitigate against discovered vulnerabilities and security gaps.
09.09	Prepare penetration testing deliverables including reports, documentations.
09.10	Model the ethics of a licensed Penetration Tester.
10.0	Demonstrate proficiency in responding to cybersecurity incidents. – The student will be able to:
10.01	Explain contingency planning and its components.
10.02	Collect data from logs and other resources to aid in detecting security incidents.

10.03	Assemble an incident response plan.
10.04	Recover from incidents by restoring services and processes.
10.05	Manage evidentiary data in an electronic environment.

Network Virtualization Specialization Standards	
08.0	Demonstrate an understanding of virtualization concepts. – The student will be able to:
08.01	Describe the purpose, uses and software features of computer virtualization.
08.02	Identify and describe virtualization products, applications and services.
08.03	Identify compatibility issues among hardware and software products.
08.04	Identify the elements necessary for a Virtual Desktop Infrastructure.
08.05	Explain the benefits and considerations for virtual storage, including local host disk, iSCSI SAN, Fibre Channel SAN, and NFS SAN.
08.06	Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
08.07	Describe backup, recovery, disaster recovery, business continuity, and replication concepts.
08.08	Describe the policies and profile management which restrict and allow features.
08.09	Identify and modify desktop catalogs, groups, and a master virtual machine.
09.0	Install and configure the virtualization server platform. – The student will be able to:
09.01	Install and configure the virtualization platform using Windows, Linux-based and Citrix applications.
09.02	Install and configure the virtualization environment to create a new farm or join an existing farm.
09.03	Automate virtual machine and cluster deployment.
09.04	Monitor and maintain license usage requirements and trends.
09.05	Manage virtualization networking and storage.
09.06	Manage user sessions from the administrative console.
09.07	Configure network connectivity and storage for the virtualization software.
10.0	Install, configure and manage virtualized clients. – The student will be able to:
10.01	Identify requirements for virtual machines according to task.
10.02	Configure the virtual environment and the virtual machine properties.
10.03	Install, configure and manage a virtual machine desktop client and a virtualized server.

10.04	Manually deploy and migrate virtual machines.
10.05	Configure and assign users to pooled virtual desktops and dedicated virtual desktops.
10.06	Convert physical machines to virtual machines.
10.07	Configure desktop resources for access by users.
10.08	Configure and monitor back up virtual machine data to shared storage.
10.09	Migrate, convert, and monitor virtual machines.
10.10	Create and update shared disks.
10.11	Optimize the end user experience.
11.0	Install, configure, and maintain a virtualized application. – The student will be able to:
11.01	Install and configure a virtualized application.
11.02	Configure virtualization applications to use a proxy.
11.03	Configure virtualized application resources for access by users.
11.04	Install and use profiling software on a virtualized application for streaming, and linking dependent profiles to allow interaction between streamed applications.
11.05	Monitor virtualization applications and implementing policies.
11.06	Migrate, convert, and monitor virtual appliances.
11.07	Test policies to verify the achievement of the desired effect.
11.08	Configure and deliver a plug-in package, and verifying that self-service applications can be added from a client device.
11.09	Install and configure provisioning services.
11.10	Optimize a provisioning services server.
11.11	Optimize the end user experience.
12.0	Demonstrate proficiency in managing a virtualization infrastructure. – The student will be able to:
12.01	Manage user access to virtualized applications and machines in the virtualization infrastructure.
12.02	Manage the infrastructure to provide high availability and data access.

12.03	Administer the virtualization environment using Windows, Linux or Citrix software.
12.04	Describe tools that can be used to monitor virtualization application servers and sessions.
12.05	Manage and maintain network infrastructure and storage resources.
12.06	Create and apply worker groups.
12.07	Configure and optimize load management.
12.08	Configure a resource pool for optimal performance.
12.09	Troubleshoot infrastructure problems and virtual environment issues.
12.10	Resolve application compatibility issues.
12.11	Optimize the end user experience.
13.0	Demonstrate proficiency in securing a virtualization infrastructure. – The student will be able to:
13.01	Secure all elements of a full virtualization solution and maintain their security.
13.02	Restrict and protect administrator access to the virtualization solution.
13.03	Ensure that the hypervisor, the central program that runs the virtual environment, is properly secured.
13.04	Carefully plan the security for a full virtualization solution before installing, configuring and deploying it.

Digital Forensics Specialization Standards	
07.0	Demonstrate proficiency in basic and advanced security concepts. – The student will be able to:
07.01	Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications.
07.02	Describe the basic categories of vulnerabilities associated with cybersecurity (i.e., hardware, software, network, human, physical, organizational).
07.03	Describe the role of certificates and their role in cybersecurity.
07.04	Describe network-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature).
07.05	Describe the use of firewalls and other means of intrusion prevention.
07.06	Describe security design principles and their role in limiting points of vulnerability.
07.07	Discuss authentication methods and strategies.
07.08	Describe the processes involved in hardening a computer system or network.
07.09	Compare and contrast the forms, limitations, and vulnerabilities associated with centralized and decentralized key management schemas, including the PKI web of trust model.
07.10	Evaluate an existing security posture and identify gaps and vulnerabilities in security.
07.11	Describe the types of penetration tests (i.e., human, physical, wireless, data networks, telecommunications), the goals of each type, the metrics tested, and the value of their results.
07.12	Compare and contrast the processes of black box versus white box penetration testing, including their characteristics, limitations, and appropriateness.
07.13	Describe common testing methodologies and standards used in penetration testing.
07.14	Describe the activities that make up the Preparation Phase of the Incident Response Life Cycle, including identification of useful tools and resources.
07.15	Describe the range of testing/evaluation and associated tools used to monitor mitigation control effectiveness.
07.16	Create a risk management framework.
07.17	Describe the purpose and scope of an Information Systems Contingency Plan (ISCP).
07.18	Identify the five main components of a contingency plan (i.e., Supporting Information, Activation and Notification, Recovery, Reconstitution, and Appendices).
07.19	Describe the purpose and scope of a cybersecurity disaster recovery plan.
07.20	Describe the purpose and scope of a cybersecurity business continuity plan.

07.21	Describe the four phases of forensic analysis and discuss the activities performed in each phase.
07.22	Describe the forensic and evidentiary considerations when determining containment.
07.23	Describe the types and sources of data collected for forensic analysis.
07.24	Explain the various forms of data and associated collection/retrieval tools for the application transport, IP, and link layers.
07.25	Describe the essential elements of forensic analysis.
08.0	Demonstrate proficiency in managing hardware involved in imaging and data collection activities. – The student will be able to:
08.01	Discuss the different types of Motherboard Connections.
08.02	Explain the components that comprise a Motherboard and their functions.
08.03	Describe the different types of permanent storage.
08.04	Compare and contrast the different host interface standards.
08.05	Describe the storage processes of Solid State drives.
08.06	Discuss the different types of removable media and their impacts on data collection.
08.07	Explain the concepts of RAID including the different Levels and their impacts on the imaging and collection process.
08.08	Compare and contrast the read/write process of both permanent and temporary storage devices.
08.09	Compare the standard Boot process to the Forensic/controlled boot process.
09.0	Demonstrate proficiency in analyzing common file systems. – The student will be able to:
09.01	Define the Master Boot Record and discuss its purpose and any important items that it may contain.
09.02	Explain the purpose of the Boot Parameter Block (BPB) and its components.
09.03	Discuss the different File Systems available in the Windows OS environment. Identify the strengths and weaknesses of each system.
09.04	Explain the process of file creation and deletion in a Windows environment including the concept of file artifacts.
09.05	Discuss the formatting process in a Windows environment.
09.06	Explain pertinent Windows OS system files related to data storage and their functions.
09.07	Examine and identify the parts of the Windows Registry.

09.08	Discuss the how Windows handles the concept of Date and Time in relation to file management.
09.09	Compare non-Windows based file systems and their advantages/disadvantages.
09.10	Define the different file systems that can be used with removable media.
09.11	Explain the concepts of Open and Closed sessions.
10.0	Demonstrate proficiency in performing computer forensics investigations. – The student will be able to:
10.01	Create security incident handling and response policies.
10.02	Recover deleted, encrypted, or damaged file information as evidence for prosecution in computer crimes such as industrial espionage, E-mail fraud, and possession of pornography.
10.03	Deploy proprietary and/or open source tools to identify an intruder's footprints.
10.04	Coordinate incident response activities in cooperation with law enforcement agencies.
10.05	Prepare proper documentations of chain of custody, accounting for where each evidence item originated from, where it is going, and what entity has possession of the evidence.
10.06	Preserve forensic integrity of evidence so they can be admissible in court.
10.07	Model highest moral and ethical standards in conducting digital forensics investigations.
11.0	Demonstrate proficiency in performing mobile device forensics. – The student will be able to:
11.01	Preserve, acquire, and examine data stored on mobile devices.
11.02	Perform forensic acquisition and examination of SIM cards.
11.03	Apply forensic principles and tools to some of the most popular smart phones.
11.04	Demonstrate proficiency in using open-source and proprietary mobile device forensics tools.
11.05	Compare forensic acquisition tools and validate the completeness and accuracy of results.
11.06	Model forensic acquisition and examination of GPS navigation devices.
11.07	Utilize the results from mobile device forensics for internal investigations or in civic/criminal litigation.
12.0	Demonstrate proficiency in incident handling and response. – The student will be able to:
12.01	Design an incident response plan including: assessment, communication, containment, evaluation, recovery, and documentation.
12.02	Model information-hiding techniques.

	12.03 Collect, seize, and protect evidence.
	12.04 Recover data from various storage devices after physical and/or logical damage.
	12.05 Search memory in real time with live and system forensics.
	12.06 Investigate network traffic using log files, time analysis, sniffers, and other traffic analysis tools.
	12.07 Explain the legal considerations to investigating E-mails as prescribed in the Electronic Communications Privacy Act.
	12.08 Model email tracing techniques in forensic investigations.
13.0	Identify key pieces of legislation and processes related to digital forensics. – The student will be able to:
	13.01 Describe the importance of creating an accurate representation of the facts.
	13.02 Explain the components of the Discovery Process.
	13.03 Discuss the 4th Amendment and its impact on the digital forensics investigative process.
	13.04 Identify laws and court cases related to computer forensics and their impacts on the investigation process.
	13.05 Identify and explain the basic Federal Rules of Evidence.
	13.06 Compare and contrast the different qualifications required to be a licensed computer forensics professional from state to state.
	13.07 Define the concept of a subpoena and explain the process of how one is obtained.
	13.08 Explain the steps required to acquire a search warrant.
	13.09 Discuss the concept of consent and the ways that it can be granted.
	13.10 Compare the legal process for civil and criminal cases.
	13.11 Define the concept of expert testimony and the process involved in being classified as an expert.
	13.12 Discuss appropriate courtroom behavior.
14.0	Understanding of the tasks related to the casework process. – The student will be able to:
	14.01 Explain the steps involved in maintaining the integrity of digital evidence.
	14.02 Discuss the process of creating a forensics image.
	14.03 Define hashing and explain its uses in ensuring image authenticity.

14.04	Describe sector slack space and its potential impact on evidence gathering.
14.05	Describe the importance of documenting the examination process.
14.06	Explain the concept of control/security access logs for images and their importance in maintaining evidence.
14.07	Describe the steps involved in preparing evidence and documents for trial.
14.08	Explain the procedures involved in creating a digital forensics investigation report including examples of report formats.
14.09	Discuss the importance of the Summation and Analysis sections of the digital investigation report.

IP Communications Specialization Standards	
08.0	Demonstrate an understanding of IP Communication theory. – The student will be able to:
	08.01 Describe the supported multivendor hardware platforms for VoIP technology, their limits, and their boundaries.
	08.02 Describe how Voice Gateways function in an IP Telephony (IPT) solution.
	08.03 Identify and describe the Local Area Network (LAN) switching products useable in an IPT solution.
09.0	Demonstrate an understanding of digitizing voice traffic and voice compression standards. – The student will be able to:
	09.01 Identify the steps required for analog to digital conversion in a VoIP network.
	09.02 Identify the signaling steps required to complete a Public Switched Telephone Network (PSTN) call.
	09.03 Define the function of Private Branch eXchanges (PBX) or key systems.
	09.04 Configure Foreign eXchange Subscriber (FXS) and Foreign eXchange Office (FXO) interfaces on a Voice Gateway.
10.0	Demonstrate an understanding of Quality of Service (QoS) requirements in a converged data and voice network. – The student will be able to:
	10.01 Identify the steps required to minimize jitter, packet loss and serialization delay in a VoIP network.
	10.02 Explain the function of IP precedence and different Class of Service (CoS) types.
	10.03 Identify and list the types of traffic coming into the interface and defining their relative priority.
	10.04 Configure a priority or custom queuing list.
11.0	Demonstrate an understanding of IP communications design. – The student will be able to:
	11.01 Identify the most appropriate gateway in IP Communication design.
	11.02 Identify and describe dial plan architecture in IP Communication design.
	11.03 Identify the correct route patterns, filters, and use of wild cards in VoIP design scenarios.
	11.04 List available classes of services in IP Communication design and their constraints.
	11.05 Describe how to use digit manipulation in VoIP design.
	11.06 Identify the appropriate QoS tools that are needed for the proper operation of voice traffic on a network.

12.0	Demonstrate an understanding of troubleshooting procedures for IP communications. – The student will be able to:
	12.01 Identify the appropriate method for providing redundancy in VoIP design.
	12.02 Describe the tools used in troubleshooting IP communication networks.
	12.03 Identify and describing the different call flows and series of events through the call traces and debug outputs when troubleshooting.
	12.04 List the alarms used in IP communication troubleshooting.
13.0	Demonstrate an understanding of utilizing advanced Voice over IP (VoIP) and Data Bundle solutions to provide a single network connection for phone services and high-speed Internet. – The student will be able to:
	13.01 Identify the required bandwidth speeds needed for uninterrupted service and fast uploads and downloads.
	13.02 Describe the impact of Voice Samples, Codecs, and Packet Size on Bandwidth.
	13.03 Describe on demand use of voice/data and voice prioritization, delivered over a private/secure line.
	13.04 Describe features for a VoIP and Data Bundle.
	13.05 Describe VoIP and Data Bundle used to dynamically alternate between voice and Internet as call volume needs dictate.
14.0	Demonstrate an understanding of using *Statistical Analysis System (*SAS) sessions to exchange data by using the TCP/IP communications access method. – The student will be able to:
	14.01 Identify that a SAS/SHARE server ID has been added to the TCP/IP SERVICES file.
	14.02 Describe how to invoke SAS sessions utilizing TCP/IP communications access method.
	14.03 Describe syntax used to identify port numbers, defined in the client TCP/IP SERVICES file.
15.0	Demonstrate how to configure VoIP fax applications for universal access servers. – The student will be able to:
	15.01 Describe fax applications that enable universal access servers to send and receive faxes across packet-based networks using modems.
	15.02 Describe universal inbox applications for fax and e-mail and how faxes and e-mails can go to the same mailbox using direct inward dialing.
	15.03 Describe how faxes can be broadcast to multiple recipients simultaneously.
16.0	Demonstrate an understanding of key concepts for Video over IP. – The student will be able to:
	16.01 Describe video over IP systems using existing standards to reduce the data to a bitstream and then an IP network to carry the encapsulated data in a stream of IP packets.
	16.02 Describe the quality of service requirements which must be fulfilled for use in broadcast carrying video over IP networks.
	16.03 Describe bandwidth requirements, the maximum allowable packet loss rate, and approaches to achieve acceptable bandwidth such

	as quantity of service, network admission control, bandwidth reservation, traffic shaping, and traffic prioritization techniques.
16.04	Describe latency variation and its effect on making synchronization more complex by making the recovery of the underlying timing of the video signal far more difficult.

Advanced Network Infrastructure Specialization Standards	
08.0	Demonstrate an understanding of routing concepts. – The student will be able to:
08.01	Describe the purpose, architecture, and operations of a router.
08.02	Identify the hardware and software components of routers.
08.03	Explain the purpose and nature of routing tables.
08.04	Describe administrative distance and routing metrics such as hop counts and cost.
08.05	Describe how a router determines a path and switches packets.
08.06	Differentiate between static and dynamic routing.
08.07	Explain the differences between class-full and classless routing.
08.08	Describe the use and operation of Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
08.09	Describe how a network converges.
09.0	Demonstrate an understanding of routing protocols. – The student will be able to:
09.01	Describe the characteristics of distance vector routing protocols.
09.02	Describe the characteristics of link state routing protocols.
09.03	Describe the differences between distance vector and link state routing protocols, and determine the best routing protocol to use in a given situation.
09.04	Describe the features and operation of current internal and external routing protocols.
09.05	Determine network resources needed for implementing EIGRP in a network.
09.06	Create an EIGRP implementation plan.
09.07	Create an EIGRP verification plan.
09.08	Verify an EIGRP solution was implemented properly using show and debug commands.
09.09	Document the verification results for an EIGRP implementation.
10.0	Demonstrate router configuration skills. – The student will be able to:
10.01	Configure and verify router interfaces.
10.02	Perform basic router configuration and using the Command Line Interface (CLI) to inspect the operations of the router.

10.03	Design and implement a classless IP addressing scheme for a network.
10.04	Configure a router for RIP version 2 operation.
10.05	Use advanced configuration commands with routers.
10.06	Configure a router for OSPF routing in a network.
10.07	Configure EIGRP routing.
10.08	Fine-tune OSPF settings on a router, including the configuration of reference bandwidth, redistribution of static and default routes, and modification of OSPF intervals, in order to optimize network performance.
10.09	Verify and troubleshoot router operations in an OSPF network.
10.10	Configure and modify metric on a router to improve network performance.
10.11	Configure summarization and default route settings on a router to optimize network performance.
10.12	Verify and troubleshoot router operations in complex network environment.
10.13	Configure port security features.
10.14	Configure general switch security features.
10.15	Configure private VLANs.
10.16	Configure VACL and PACL.
11.0	Demonstrate an understanding of LAN design and concepts. – The student will be able to:
11.01	Identify the layers and functions of switched network architecture.
11.02	Describe the principles and benefits of a hierarchical network design.
11.03	Explain the technology and media access control method for Ethernet networks.
11.04	Describe the issues associated with Layer 2.
11.05	Describe the operation of a LAN switch.
11.06	Describe the benefits of Virtual Local Area Networks (VLAN).
11.07	Identify and describe the different VLAN encapsulation protocols and their operation.
11.08	Describe the purpose and operation of VLAN Trunking Protocol (VTP) in the management of a switched network domain.

11.09	Describe the purpose and operation of Spanning Tree Protocol (STP), and its variants.
11.10	Describe the use of Inter-VLAN routing to connect different Networks in a switch-based network topology.
11.11	Analyze business requirements and design a LAN structure to meet those requirements.
11.12	Discuss quality-of-service considerations and switching prioritization.
11.13	Implement a VoIP support solution.
11.14	Implement video support solution.
12.0	Demonstrate VLAN configuration skills. – The student will be able to:
12.01	Perform and verify initial LAN switch configuration tasks including remote access management, switch port modes, and trunks.
12.02	Configure, verify, and troubleshoot VLANs on a LAN switch.
12.03	Implement a VLAN Domain by configuring LAN switches for VTP network operation.
12.04	Configure a Router to provide Inter-VLAN routing using multiple physical interfaces, and on a single physical interface with sub-interfaces.
12.05	Configure and troubleshoot Spanning Tree Protocol and its variants on a switched network environment.
12.06	Configure and verify the bridge to optimize STP.
12.07	Establish and configure port priorities.
12.08	Troubleshoot and resolve issues with STP operations.
12.09	Manage router and switch Operating System software.
12.10	Create a Layer 3 path control implementation plan based upon the results of the redistribution analysis.
12.11	Create a Layer 3 path control verification plan.
12.12	Configure Layer 3 path control.
12.13	Verify that a Layer 3 path control was implemented.
12.14	Document results of a Layer 3 path control implementation and verification plan.
12.15	Implement basic teleworker and branch services.
12.16	Describe broadband technologies.

12.17	Configure basic broadband connections.
12.18	Describe basic VPN technologies.
12.19	Configure Generic Routing Encapsulation (GRE).
12.20	Describe branch access technologies.
12.21	Configure private VLANs.
12.22	Configure VACL and PACL.
12.23	Configure switch-to-switch connectivity for the VLAN based solution.
12.24	Configure loop prevention for the VLAN based solution.
12.25	Configure Access Ports for the VLAN based solution.
12.26	Determine network resources needed for implementing a VLAN based solution on a network.
12.27	Create a VLAN based implementation plan.
12.28	Create a VLAN based verification plan.
12.29	Verify the VLAN based solution was implemented properly using show and debug commands.
12.30	Document the verification after implementing a VLAN solution.
13.0	Demonstrate an understanding of basic wireless concepts and configuration. – The student will be able to:
13.01	Describe standards associated with wireless media, including IEEE, Wi-Fi Alliance, and ITU/FCC standards.
13.02	Identify and describe the purpose of the components in a small wireless network, such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS).
13.03	Perform a site survey and identify common implementation issues.
13.04	Identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points.
13.05	Configure and verify WLAN design and functionality.
13.06	Describe and configure wireless security, including Wi-Fi Protected Access (WPA).
13.07	Describe and troubleshoot common wireless-network implementation issues such as interference and misconfiguration.
13.08	Implement a wireless extension of a Layer 2 solution.

14.0	Demonstrate an understanding of wide area networks (WAN). – The student will be able to:
14.01	Describe WAN and MAN topologies.
14.02	Differentiate between WAN and LAN topologies.
14.03	Identify and describe WAN protocols.
14.04	Describe the impact of applications (Voice Over IP, Video Over IP) on a network.
14.05	Identify major network issues associated with the Internet, intranets and extranets.
14.06	Explain the differences between the use of leased lines, packet-switched, and circuit-switched technologies.
14.07	Describe typical WAN links and discuss bandwidth considerations.
14.08	Identify and manage licensing.
14.09	Document results of a redistribution, implementation, and verification plan.
14.10	Identify the differences between implementing an IPv4 and IPv6 redistribution solution.
14.11	Determine network resources needed for implementing high availability on a network.
14.12	Document results of high availability implementation and verification.
15.0	Demonstrate Wide Area Network configuration skills. – The student will be able to:
15.01	Configure and verify Point to Point WAN connection.
15.02	Configure and verify a Packet Switched WAN connection.
15.03	Configure and verify a basic WAN serial connection, a PPP connection between routers, and Frame Relay.
15.04	Configure and verify a PPP connection between routers, and Configure and verify a Frame Relay between routers.
15.05	Troubleshoot WAN implementation issues.
15.06	Implement LAN/WAN connections, including virtual private networks (VPN), permanent virtual circuits (PVC), frame relay, tunneling, remote and mobile user access.
15.07	Create a redistribution implementation plan based upon the results from a redistribution analysis.
15.08	Create a redistribution verification plan.
15.09	Configure a redistribution solution.

15.10	Verify that a redistribution was implemented.
15.11	Create a high availability implementation plan.
15.12	Create a high availability verification plan.
15.13	Implement first hop redundancy protocols.
15.14	Implement switch supervisor redundancy.
15.15	Verify high availability solution was implemented properly using show and debug commands.
16.0	Demonstrate an understanding of network security. – The student will be able to:
16.01	Implement basic switch security measures such as port security, trunk access, and management VLANs.
16.02	Identify current network security threats and explaining how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications.
16.03	Describe the functions of common security appliances and applications.
16.04	Implement recommended security practices to secure network devices.
16.05	Discuss the functions of authentication servers.
16.06	Describe the function and use of Access Control Lists (ACLs).
16.07	Verify, monitor, and troubleshoot ACLs in a network environment.
16.08	Determine network resources needed for implementing a security solution.
16.09	Create an implementation plan for the security solution.
16.10	Create a verification plan for the security solution.
16.11	Verify the Security based solution was implemented properly using show and debug commands.
16.12	Document the verification results after implementing a Security solution.
16.13	Configure port security features.
16.14	Configure general switch security features.
17.0	Demonstrate an understanding of Remote Access. – The student will be able to:

17.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
17.02	Configure static and dynamic routing, NAT and Internet Connection Sharing (ICS).
17.03	Configure remote access services, protocols and policies, conditions and settings.
17.04	Configure Remote Access Dial-In User Service (RADIUS).
17.05	Configure wireless clients with group policy.
17.06	Monitor and troubleshoot remote access and wireless connections.
18.0	Demonstrate an understanding of IP Addressing Services. – The student will be able to:
18.01	Describe the purpose and operation of DHCP and DNS in a networked environment.
18.02	Configure, verify, and troubleshoot DHCP and DNS operation on a router.
18.03	Describe the operation and use of NAT and Port Address Translation (PAT) to provide Internet access to Private IP Address networks.
18.04	Configure, verify, and troubleshoot NAT on a router, including static translation, use of IP Address pools, and sharing a public IP address on a router interface.
18.05	Describe the purpose and operation of IPv6.
18.06	Configure, verify, and troubleshoot IPv6 routing in a network.
18.07	Determine network resources needed for implementing IPv6 on a network.
18.08	Create an IPv6 implementation plan.
18.09	Create an IPv6 verification plan.
18.10	Configure IPv6 routing.
18.11	Configure IPv6 interoperation with IPv4.
18.12	Verify IPv6 solution was implemented properly using show and debug commands.
18.13	Document verification results for an IPv6 implementation plan.
19.0	Demonstrate an understanding of network maintenance, support and troubleshooting. – The student will be able to:
19.01	Identify, interpret and maintain network documentation, procedures and practices.
19.02	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.

19.03	Follow standard operating procedures for troubleshooting hardware and software.
19.04	Manage, maintain and backup router and switch system and configuration files.
19.05	Recognize and resolve hardware and software configuration problems.
19.06	Identify and resolve common network problems at layers 1, 2, 3, and 7 using a layered model approach. Describe the use and features of diagnostic test equipment.
19.07	Determine type of programs and procedures required to: baseline network performance, identify intrusion and unacceptable system use, identify performance issues, predict system failures, and optimize network availability.
19.08	Use network monitoring and management tools effectively to integrate and manage network resources.
19.09	Explain RMON and SNMP and their use in monitoring a network.
19.10	Configure network devices to send SNMP traps or alerts to network management systems.
19.11	Establish and document a network baseline.
19.12	Compare and analyze initial performance measurements with the availability of critical network devices and connections to determine the difference between abnormal behavior and proper network performance as the network grows or traffic patterns change.
19.13	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.
19.14	Determine network resources needed for implementing a switch based Layer 3 solution.
19.15	Create an implementation plan for the switch based Layer 3 solution.
19.16	Create a verification plan for the switch based Layer 3 solution.
19.17	Configure routing interfaces.
19.18	Configure Layer 3 security.
19.19	Verify the switch based Layer 3 solution was implemented properly using show and debug commands.
19.20	Document the verification results after implementing a switch based Layer 3 solution.
19.21	Develop a plan to monitor and manage a network.
19.22	Perform network monitoring using IOS tools.
19.23	Perform routine IOS device maintenance.
19.24	Isolate sub-optimal internetwork operation at the correctly defined OSI Model layer.

19.25 Troubleshoot EIGRP.
19.26 Troubleshoot OSPF.
19.27 Troubleshoot eBGP.
19.28 Troubleshoot routing redistribution solution.
19.29 Troubleshoot a DHCP client and server solution.
19.30 Troubleshoot NAT.
19.31 Troubleshoot first hop redundancy protocols.
19.32 Troubleshoot IPv6 routing.
19.33 Troubleshoot IPv6 and IPv4 interoperability.
19.34 Troubleshoot switch-to-switch connectivity for the VLAN based solution.
19.35 Troubleshoot loop prevention for the VLAN based solution.
19.36 Troubleshoot access ports for the VLAN based solution.
19.37 Troubleshoot private VLANS.
19.38 Troubleshoot port security.
19.39 Troubleshoot general switch security.
19.40 Troubleshoot VACLs and PACLs.
19.41 Troubleshoot switch virtual interfaces (SVIs).
19.42 Troubleshoot switch supervisor redundancy.
19.43 Troubleshoot switch support of advanced services (i.e., Wireless, VoIP, Video).
19.44 Troubleshoot a VoIP support solution.
19.45 Troubleshoot a video support solution.
19.46 Troubleshoot Layer 3 security.
19.47 Troubleshoot issues related to ACLs used to secure access to Cisco routers.

19.48 Troubleshoot configuration issues related to accessing the AAA server for authentication purposes.
19.49 Troubleshoot security issues related to IOS services (i.e., finger, NTP, HTTP, FTP, RCP).

Linux System Administrator Specialization Standards	
08.0	Understand and use essential tools. – The student will be able to:
08.01	Access a shell prompt and issue commands with correct syntax.
08.02	Use input-output redirection (>, >>, |, 2>, etc.).
08.03	Use grep and regular expressions to analyze text.
08.04	Access remote systems using ssh.
08.05	Log in and switch users in multiuser targets.
08.06	Archive, compress, unpack, and uncompress files using a variety of tools.
08.07	Create and edit text files.
08.08	Create, delete, copy, and move files and directories.
08.09	Create hard and soft links.
08.10	List, set, and change standard ugo/rwx permissions.
08.11	Locate, read, and use system documentation including man, info, and files in /usr/share/doc.
09.0	Operate running systems. – The student will be able to:
09.01	Boot, reboot, and shut down a system normally.
09.02	Boot systems into different targets manually.
09.03	Interrupt the boot process in order to gain access to a system.
09.04	Identify CPU/memory intensive processes, adjust process priority with renice, and kill processes.
09.05	Locate and interpret system log files and journals.
09.06	Perform various logging related activities such as configuring logging, log rotation and log reporting.
09.07	Access a virtual machine's console.
09.08	Discuss metric storage, collection, and display.
09.09	Explain the meaning and use of common metrics such as utilization values for CPU, memory, disk space, disk I/O, and network bandwidth.

	09.10 Start and stop virtual machines.
	09.11 Start, stop, and check the status of network services.
	09.12 Securely transfer files between systems.
10.0	Configure local storage. – The student will be able to:
	10.01 List, create, delete partitions on MBR and GPT disks.
	10.02 Create and remove physical volumes, assign physical volumes to volume groups, and create and delete logical volumes.
	10.03 Configure systems to mount file systems at boot by Universally Unique ID (UUID) or label.
	10.04 Create, use and remove snapshots of logical volumes.
	10.05 Add new partitions and logical volumes, and swap to a system non-destructively.
	10.06 Describe the differences between hard disks and solid-state disks, and issues related to both.
	10.07 Compare different RAID levels.
	10.08 Identify the features of Storage Area Networks (SANS) and Network Area Storage (NAS) and the common uses of these storage solutions.
11.0	Create and configure file systems. – The student will be able to:
	11.01 Create, mount, unmount, and using various file systems.
	11.02 Mount and unmount CIFS and NFS network file systems.
	11.03 Extend existing logical volumes.
	11.04 Create and configure set-GID directories for collaboration.
	11.05 Create and manage Access Control Lists (ACLs).
	11.06 Diagnose and correct file permission problems.
12.0	Deploy, configure, and maintain systems. – The student will be able to:
	12.01 Configure networking and hostname resolution statically or dynamically.
	12.02 Schedule tasks using at and cron.
	12.03 Start and stop services and configure services to start automatically at boot.

12.04	Configure systems to boot into a specific target automatically.
12.05	Perform an unattended system install.
12.06	Configure a physical machine to host virtual guests.
12.07	Install Linux systems as virtual guests.
12.08	Configure systems to launch virtual machines at boot.
12.09	Configure network services to start automatically at boot.
12.10	Configure a system to use time services.
12.11	Install and update software packages from a remote repository or a local file system.
12.12	Update the kernel package appropriately to ensure a bootable system.
12.13	Modify the system bootloader.
13.0	Manage users and groups. – The student will be able to:
13.01	Create, delete, and modify local and global user accounts.
13.02	Change passwords and adjust password aging for local and global user accounts.
13.03	Create, delete, and modify local and global groups and group memberships.
13.04	Configure a system to use an existing authentication service for user and group information.
14.0	Manage security. – The student will be able to:
14.01	Describe security basic concepts and mechanisms, including encryption, password safety, message digests and system security requirements.
14.02	Practice proper security techniques and monitoring.
14.03	Configure firewall settings using firewall-config, firewall-cmd, or iptables.
14.04	Configure key-based authentication for SSH.
14.05	Set enforcing and permissive modes for SELinux.
14.06	List and identify SELinux file and process context.
14.07	Restore default file contexts.

14.08 Use boolean settings to modify system SELinux settings.
14.09 Diagnose and address routine SELinux policy violations.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Network Server Administration (0511100112) – Primary/Secondary: 24/18 hours
Network Enterprise Administration (0511100113) – Primary/Secondary: 29/26 hours
Network Infrastructure (0511100114) – Primary/Secondary: 21/16 hours
Advanced Network Infrastructure (0511100115) – Primary/Secondary: 36/28 hours
Network Virtualization (0511100116) – Primary: 24/18 hours
Advanced Network Virtualization (0511100117) – Primary/Secondary: 34/27 hours
Network Security (0511100118) – Primary/Secondary: 30/20 hours
Digital Forensics (0511100119) – Primary/Secondary: 32/24 hours
IP Communications (0511100120) – Primary/Secondary: 32/21 hours
Network Support Technician (0511100121) – Primary/Secondary: 21/16 hours

Linux System Administrator (0511100122) – Primary/Secondary: 24/21 hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Systems Technology (60)**
Career Cluster: **Information Technology**

AS	
CIP Number	1511100112
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts 15-1142 – Network and Computer Systems Administrators 15-1152 – Computer Network Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as cabling specialists, network control operators, data communications analysts, network technicians, computer security specialists, network specialists, network managers, network systems analysts, network systems technicians, network troubleshooters, WAN/LAN managers, or systems administrators in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to planning, installing, configuring, monitoring, troubleshooting, and managing computer networks in a LAN/WAN environment. Students will be prepared to apply conceptual, theoretical and practical knowledge to the workplace utilizing technical skills learned during the program.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of core standards and eight different tracts to permit students to specialize in network administration, network infrastructure, network virtualization, network security/cybersecurity, IP communications, digital forensics, advanced network infrastructure. Or UNIX Linux system administrator. Standards comprising each specialization area are completed in addition to the core standards.

Due to the foundational nature of the core, it is recommended that students complete the core, or demonstrate a mastery of the student performance standards contained in the core, before advancing to courses comprising a specialization tract. Standards in the core prepare students with requisite foundational knowledge and skills related to computer maintenance and support, networking fundamentals, operating systems, network security, technical communications, and project management. The total Associate in Science degree program consists of 60 credit hours.

In addition, students will complete the standards in one of the following specializations:

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency in basic computer network maintenance and support.
02.0 Demonstrate a fundamental understanding of computer networking.
03.0 Demonstrate an understanding of common operating system concepts and associated practices.
04.0 Demonstrate fundamental proficiency in network security essentials.
05.0 Demonstrate proficiency in technical communications and workplace protocols.
06.0 Demonstrate a basic understanding of project management concepts and processes.
07.0 Demonstrate workplace-readiness skills.

In addition, students will complete the standards in one of the following specializations:

Network Administration Specialization Standards

08.0 Demonstrate an understanding of the directory infrastructure and installation.
09.0 Demonstrate an understanding of group policy.
10.0 Demonstrate an understanding of implementing sites to manage Active Directory replication.
11.0 Demonstrate an understanding of maintaining directory availability.
12.0 Demonstrate how to install and deploy a server operating system.
13.0 Demonstrate how to provide infrastructure services.
14.0 Demonstrate how to provide file and print services.
15.0 Demonstrate how to provide remote and wireless network access.
16.0 Demonstrate how to monitor and maintain network servers and services.
17.0 Demonstrate an understanding of securing data transmission and authentication.
18.0 Demonstrate an understanding of planning for business continuity and high availability.
19.0 Demonstrate workplace-readiness skills.

Network Infrastructure Specialization Standards

08.0 Demonstrate understanding of routing concepts.
09.0 Demonstrate understanding of routing protocols.
10.0 Demonstrate router configuration skills.
11.0 Demonstrate an understanding of LAN design and concepts.
12.0 Demonstrate VLAN configuration skills.
13.0 Demonstrate an understanding of basic wireless concepts and configuration.
14.0 Demonstrate an understanding of wide area networks (WAN).
15.0 Demonstrate WAN configuration skills.
16.0 Demonstrate an understanding of network security.

17.0 Demonstrate an understanding of remote access.
18.0 Demonstrate an understanding of IP addressing services.
19.0 Demonstrate an understanding of network maintenance, support and troubleshooting.

Network Security/Cybersecurity Specialization Standards

08.0 Demonstrate proficiency in securing network infrastructures and protecting data.
09.0 Demonstrate proficiency in performing security penetration testing.
10.0 Demonstrate proficiency in responding to cybersecurity incidents.

Network Virtualization Specialization Standards

08.0 Demonstrate an understanding of virtualization concepts.
09.0 Install and configure the virtualization server platform.
10.0 Install, configure and manage virtualized clients.
11.0 Install, configure, test, and monitor virtualized applications.
12.0 Demonstrate proficiency in managing a virtualization infrastructure.

Digital Forensics Specialization Standards

08.0 Demonstrate proficiency in basic and advanced security concepts.
09.0 Demonstrate proficiency in managing hardware involved in imaging and data collection activities.
10.0 Demonstrate proficiency in analyzing common file systems.
11.0 Demonstrate proficiency in performing computer forensics investigations.
12.0 Demonstrate proficiency in performing mobile device forensics.
13.0 Demonstrate proficiency in incident handling and response.
14.0 Identify key pieces of legislation and processes related to digital forensics.
15.0 Demonstrate an understanding of the tasks related to the casework process.

IP Communications Specialization Standards

08.0 Demonstrate an understanding of IP Communication theory.
09.0 Demonstrate an understanding of digitizing voice traffic and voice compression standards.
10.0 Demonstrate an understanding of quality of service (QoS) requirements in a converged data and voice network.
11.0 Demonstrate an understanding of IP communications design.
12.0 Demonstrate an understanding of troubleshooting procedures for IP communications.
13.0 Demonstrate an understanding of utilizing advanced Voice over IP (VoIP) and Data Bundle solutions to provide a single network connection for phone services and high-speed Internet.
14.0 Demonstrate an understanding of using Statistical Analysis System (SAS) sessions to exchange data by using the TCP/IP communications access method.
15.0 Demonstrate how to configure VoIP fax applications for universal access servers.

16.0 Demonstrate an understanding of key concepts for Video over IP.

Advanced Network Infrastructure Specialization Standards

08.0 Demonstrate an understanding of routing concepts.
09.0 Demonstrate an understanding of routing protocols.
10.0 Demonstrate router configuration skills.
11.0 Demonstrate an understanding of LAN design and concepts.
12.0 Demonstrate VLAN configuration skills.
13.0 Demonstrate an understanding of basic wireless concepts and configuration.
14.0 Demonstrate an understanding of wide area networks (WAN).
15.0 Demonstrate Wide Area Network configuration skills.
16.0 Demonstrate an understanding of network security.
17.0 Demonstrate an understanding of remote access.
18.0 Demonstrate an understanding of IP addressing services.
19.0 Demonstrate an understanding of network maintenance, support and troubleshooting.

Linux System Administrator Specialization Standards

08.0 Understand and use essential tools.
09.0 Operate running systems.
10.0 Configure local storage.
11.0 Create and configure file systems.
12.0 Deploy, configure, and maintain systems.
13.0 Manage users and groups.
14.0 Manage security.

Florida Department of Education
Student Performance Standards

Program Title: **Network Systems Technology (60)**
CIP Number: **1511100112**
Program Length: **60 credit hours**
SOC Code(s): **15-1122, 15-1142, 15-1152**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic computer network maintenance and support. – The student will be able to:
01.01	Describe the main computer components and their functions.
01.02	Describe the operation of computer systems, including input and output systems, file systems, device management, program loading and execution and data storage.
01.03	Demonstrate the safe and ethical use of computers.
01.04	Demonstrate proficiency in connecting to and safely using the Internet.
01.05	Describe emerging computer technologies and discuss their potential impact.
01.06	Implement proper procedures for handling and safeguarding equipment.
01.07	Describe procedures for proper disposal of computer components.
01.08	Install, configure, maintain and secure computer systems and peripherals following institutional protocol.
01.09	Configure and update firmware and ROM-BIOS.
01.10	Implement work order procedures.
01.11	Design and implement systems redundancy and data backups.
01.12	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
01.13	List the steps in problem solving.
01.14	Recognize and resolve basic computer configuration problems.

02.0	Demonstrate a fundamental understanding of computer networking. – The student will be able to:
02.01	Explain the use of binary numbers and perform binary arithmetic.
02.02	Describe current network environments.
02.03	Describe network communications and architecture.
02.04	Identify network components, media, connectors, applications and protocols.
02.05	Compare and contrast the OSI and TCP/IP reference models and their layers.
02.06	Identify and describe current relevant IEEE network standards.
02.07	Create an IP addressing scheme using Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
02.08	Identify and discuss issues related to networked environments, such as security, access control, fair use, privacy and redundancy.
02.09	Identify and discuss issues related to naming conventions for user IDs, email, passwords, and network hosts and devices.
02.10	Identify standard network topologies and describe the advantages and disadvantages of each topology.
02.11	Describe the major functions of LAN protocols.
02.12	Explain the functions of wireless components, standards, hardware, software, and infrastructure design.
02.13	Configure and manage the TCP/IP protocol stack.
02.14	Describe how TCP and UDP Port addresses, IP addresses, and MAC addresses function, and how they are used to deliver data across the network.
02.15	Identify emerging technologies and discuss related technical issues.
02.16	Design a local area network (LAN), including the specification of architecture, hardware and software.
02.17	Identify the advantages and use of virtual local area networks (VLANs).
02.18	Identify and explain wide area network (WAN) concepts.
02.19	Plan, configure and test a small network and establish baselines.
02.20	Describe the major functions of network server software components.
02.21	Install applications on a server and configure clients for network access.

03.0	Demonstrate an understanding of common operating system concepts and associated practices. – The student will be able to:
03.01	Describe the components and functions of major operating systems.
03.02	Compare and contrast major functions and features of current network operating systems (including directory services).
03.03	Install, configure and update client and server operating systems.
03.04	Describe the purpose and uses of computer virtualization.
03.05	Manage device drivers and software for peripheral devices.
03.06	Manage the network and firewall settings of a client.
03.07	Use an operating system for activities such as data and file management.
03.08	Identify current systems utilities and describe their functions.
03.09	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.10	Create, use, maintain, backup and restore system configuration files.
03.11	Describe procedures for uninstalling operating system software.
03.12	Install and configure client software for connecting to LANs, WANs, and the Internet.
03.13	Demonstrate knowledge of basic troubleshooting methodology.
04.0	Demonstrate fundamental proficiency in network security essentials. – The student will be able to:
04.01	Describe common security threats to, and vulnerabilities of, computer systems and the corresponding best practices for mitigation.
04.02	Define and describe malicious software and techniques to protect systems from its effects.
04.03	Describe Denial of Service attacks and means to defend against them.
04.04	Identify the risks and techniques of data loss and its prevention.
04.05	Describe the principles and techniques of securing data storage and transmission.
04.06	Identify current encryption and authentication standards.
04.07	Implement security policies, including compliance and operational security.
04.08	Enable access control, identity management and security logging.

04.09	Manage client and network system security software and related updates.
04.10	Describe the functions and characteristics of firewalls.
04.11	Perform a ping sweep to identify network hosts.
04.12	Perform a port scan to probe network hosts for open TCP and UDP ports.
04.13	Describe the purpose and operation of network protocol analyzers.
04.14	Utilize a network protocol analyzer to capture and analyze network traffic for security issues.
05.0	Demonstrate proficiency in technical communications and workplace protocols. – The student will be able to:
05.01	Identify issues in the communication of technical information to a non-technical audience.
05.02	Create, utilize, and maintain system documentation.
05.03	Utilize online resources to locate and evaluate technical information and documentation.
05.04	Identify and discuss issues contained within professional codes of conduct.
05.05	Prepare and deliver a technical presentation.
05.06	Create and interpret technical and business communications.
05.07	Demonstrate the basic principles of teamwork and the techniques for being a productive and effective contributing member of a team.
05.08	Identify and use acceptable strategies for resolving conflicts in the workplace.
05.09	Deliver and follow oral and written technical instructions.
05.10	Describe the roles of the network specialist in a business enterprise.
05.11	Document problems and solutions in service reports and maintain proper documentation.
05.12	Perform research on technical issues using Internet and database resources.
06.0	Demonstrate a basic understanding of project management concepts and processes. – The student will be able to:
06.01	Examine the organization, planning, and controlling of projects.
06.02	Define Project Integration Management.
06.03	Describe project phases, process groups, and the full project life cycle.

06.04	Choose appropriate actions in situations that require effective time management. Understand the basic tools and techniques to plan, organize, and manage a project.
06.05	Describe a project life cycle from initiation to planning through execution, acceptance, support, quality, budgeting, and closure.
06.06	Understand the factors contributing to risk management planning.
06.07	Understand the project environment including: cultural, social, international, political and physical.
06.08	Describe the principles of identifying, developing, and managing resources.
06.09	Plan and monitor a project budget and schedule using project management tools.
06.10	Understand the technical and human aspects of project control, especially change control.
06.11	Describe the basic tools and techniques of managing project quality and risk.
06.12	Understand the contextual relationship between the project and the organization that hosts the project.
06.13	Demonstrate an understanding of the importance of working in teams, managing team members, and interacting with stakeholders.
06.14	Understand the importance of ethical considerations in every aspect of a project's operation.
07.0	Demonstrate workplace-readiness skills. – The student will be able to:
07.01	Understand the value of proper communication in the classroom and workplace environment. Follow oral and written instructions.
07.02	Participate in group discussions as a member and as a leader.
07.03	Understand the importance of self-motivation and responsibility in completing assigned tasks.
07.04	Choose appropriate actions in situations requiring effective time management.
07.05	Apply principles and techniques for being a productive, contributing member of a team.
07.06	Discuss the ethical aspects of intellectual property rights and licensing issues.
07.07	Identify and discuss issues contained within professional codes of conduct.
07.08	Use appropriate communication skills, courtesy, manners, and dress in the workplace.

Network Administration Specialization Standards	
08.0	Demonstrate an understanding of the directory services infrastructure and installation. – The student will be able to:
08.01	Describe the architecture of Active Directory.
08.02	Discuss how Active Directory works.
08.03	Describe the Active Directory design, plan, and implementation processes.
08.04	Create a forest and domain structure.
08.05	Configure the Domain Name Service (DNS) in an Active Directory environment.
08.06	Raise the functional level of a forest and a domain.
08.07	Create trust relationships between domains.
08.08	Create, manage, and delegate administrative control for organizational units.
09.0	Demonstrate an understanding of organizational units and related objects. – The student will be able to:
09.01	Discuss user, group, and computer accounts.
09.02	Create and manage multiple accounts.
09.03	Implement user principal name suffixes.
09.04	Move objects in Active Directory.
09.05	Plan an account strategy.
09.06	Plan an Active Directory audit strategy.
10.0	Demonstrate an understanding of group policy. – The student will be able to:
10.01	Create and configure group policy objects (GPOs).
10.02	Configure group policy refresh rates and group policy settings.
10.03	Manage GPOs.
10.04	Verify and troubleshoot group policy.
10.05	Delegate administrative control of group policy.

	10.06 Plan a group policy strategy for the enterprise.
	10.07 Configure, deploy and maintain applications using group policy, System Center tools and Terminal Services.
	10.08 Monitor and maintain security policies.
	10.09 Prepare and implement group policy strategy and backup/recovery of group policy objects.
11.0	Demonstrate an understanding of implementing sites to manage Active Directory replication. – The student will be able to:
	11.01 Discuss directory services replication.
	11.02 Design and document site topology.
	11.03 Manage site topology.
	11.04 Troubleshoot replication failures.
	11.05 Plan, create and configure a site.
	11.06 Implement the global catalog in Active Directory.
	11.07 Plan and determine the placement and type of domain controllers in Active Directory.
	11.08 Identify the various Operations Master Roles.
	11.09 Plan the placement of Operations Masters.
	11.10 Transfer and seize Operations Master Roles.
12.0	Demonstrate an understanding of maintaining Active Directory services availability. – The student will be able to:
	12.01 Create an Active Directory implementation plan for a business enterprise.
	12.02 Implement the Active Directory infrastructure for a business enterprise.
	12.03 Describe the maintenance of the Active Directory.
	12.04 Move and defragment an Active Directory database.
	12.05 Back up and restore a Active Directory.
	12.06 Monitor an Active Directory.

13.0	Demonstrate how to install and deploy a server operating system. – The student will be able to:
13.01	Identify server operating system (OS) versions, editions, features and capabilities.
13.02	Assess server installation readiness by inventorying hardware.
13.03	Describe the methods, options and requirements for a Windows server installation and upgrade.
13.04	Perform an attended and an unattended OS installation.
13.05	Configure basic network settings.
13.06	Configure storage.
13.07	Configure operating systems licensing.
13.08	Describe, identify and choose server roles and role services.
13.09	Perform a system review and troubleshoot installation issues.
13.10	Document the system installation.
13.11	Automate server deployments using unattended installation tools and Windows.
13.12	Implement deployment services.
14.0	Demonstrate how to provide infrastructure services. – The student will be able to:
14.01	Describe the purpose and function of Dynamic Host Configuration Protocol (DHCP).
14.02	Install, configure, and authorize the DHCP server role.
14.03	Manage, backup and restore the DHCP Database.
14.04	Configure the DHCP Relay Agent.
14.05	Describe the DNS name resolution process.
14.06	Configure DNS zones, records and replication.
14.07	Integrate DNS servers with Active Directory.
14.08	Configure name resolution for client computers.

15.0	Demonstrate how to provide file and print services. – The student will be able to:
15.01	Design a file sharing strategy.
15.02	Install the file and print server roles and services.
15.03	Manage file sharing security, encryption, redundancy, and offline access.
15.04	Manage disk quotas, file screening and shadow copy services.
15.05	Backup and restore files.
15.06	Configure Distributed File System (DFS) roots, targets and replication.
15.07	Identify and install print drivers.
15.08	Manage printer security, priorities, schedules and pools.
15.09	Publish printers and file shares to Active Directory.
15.10	Monitor and troubleshoot print and file services.
16.0	Demonstrate how to provide remote and wireless network access. – The student will be able to:
16.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
16.02	Configure static and dynamic routing, Network Address Translation (NAT) and Internet Connection Sharing (ICS).
16.03	Configure remote access services, protocols and policies, conditions and settings.
16.04	Configure Remote Access Dial-In User Service (RADIUS).
16.05	Configure wireless clients with group policy.
16.06	Monitor and troubleshoot remote access and wireless connections.
17.0	Demonstrate how to monitor and maintain network servers and services. – The student will be able to:
17.01	Monitor and compare network and server performance data to establish and document baselines, isolate problems and optimize performance, adaptability, and scalability.
17.02	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.
17.03	Monitor event logs for information, errors and warnings.
17.04	Maintain system documentation and service histories.

	17.05 Configure server and client settings to implement patch management strategy.
	17.06 Develop strategies for remote server management using command-line and GUI tools.
18.0	Demonstrate an understanding of securing data transmission and authentication. – The student will be able to:
	18.01 Explain the social, ethical and technical issues regarding data integrity and confidentiality.
	18.02 Secure network traffic using IPSec.
	18.03 Configure network authentication.
	18.04 Install, configure and manage certificate services.
	18.05 Describe and deploy a network access protection strategy.
	18.06 Configure firewall settings.
	18.07 Identify ports and protocols and create filters for incoming and outgoing traffic.
19.0	Demonstrate an understanding of planning for business continuity and high availability. – The student will be able to:
	19.01 Discuss virtualization architectures.
	19.02 Estimate data storage requirements.
	19.03 Select a storage technology.
	19.04 Plan for storage fault tolerance.
	19.05 Develop strategies to ensure application and service availability.
	19.06 Plan for backup and recovery of data, servers, and directory services.

Network Infrastructure Specialization Standards	
08.0	Demonstrate an understanding of routing concepts. – The student will be able to:
08.01	Describe the purpose, architecture, and operations of a router.
08.02	Identify the hardware and software components of routers.
08.03	Explain the purpose and nature of routing tables.
08.04	Describe administrative distance and routing metrics such as hop counts and cost.
08.05	Describe how a router determines a path and switches packets.
08.06	Differentiate between static and dynamic routing.
08.07	Explain the differences between class-full and classless routing.
08.08	Describe the use and operation of VLSM and CIDR.
08.09	Describe how a network converges.
09.0	Demonstrate an understanding of routing protocols. – The student will be able to:
09.01	Describe the characteristics of distance vector routing protocols.
09.02	Describe the characteristics of link state routing protocols.
09.03	Describe the differences between distance vector and link state routing protocols and determine the best routing protocol to use in a given situation.
09.04	Describe the features and operation of current internal and external routing protocols.
10.0	Demonstrate router configuration skills. – The student will be able to:
10.01	Configure and verify router interfaces.
10.02	Perform basic router configuration using the Command Line Interface (CLI) to inspect the operations of the router.
10.03	Design and implement a classless IP addressing scheme for a network.
10.04	Configure a router for RIP version 2 operation.
10.05	Use advanced configuration commands with routers.
10.06	Configure a router for OSPF routing in a network.

10.07	Fine-tune OSPF settings on a router, including the configuration of reference bandwidth, redistribution of static and default routes, and modification of OSPF intervals, in order to optimize network performance.
10.08	Verify and troubleshoot router operations in an OSPF network.
10.09	Configure and modify metric on a router to improve network performance.
10.10	Configure summarization and default route settings on a router to optimize network performance.
10.11	Verify and troubleshoot router operations in complex network environment.
11.0	Demonstrate an understanding of LAN design and concepts. – The student will be able to:
11.01	Identify the layers and functions of switched network architecture.
11.02	Describe the principles and benefits of a hierarchical network design.
11.03	Explain the technology and media access control method for Ethernet networks.
11.04	Describe the issues associated with Layer 2.
11.05	Describe the operation of a LAN switch.
11.06	Describe the benefits of Virtual Local Area Networks (VLAN).
11.07	Identify and describe the different VLAN encapsulation protocols and their operation.
11.08	Describe the purpose and operation of VLAN Trunking Protocol (VTP) in the management of a switched network domain.
11.09	Describe the purpose and operation of Spanning Tree Protocol (STP), and its variants.
11.10	Describe the use of Inter-VLAN routing to connect different Networks in a switch-based network topology.
11.11	Analyze business requirements and design a LAN structure to meet those requirements.
11.12	Discuss quality-of-service considerations and switching prioritization.
12.0	Demonstrate VLAN configuration skills. – The student will be able to:
12.01	Perform and verify initial LAN switch configuration tasks including remote access management, switch port modes, and trunks.
12.02	Configure, verify, and troubleshoot VLANs on a LAN switch.
12.03	Implement a VLAN Domain by configuring LAN switches for VTP network operation.
12.04	Configure a router to provide Inter-VLAN routing using multiple physical interfaces, and on a single physical interface with sub-interfaces.

12.05	Configure and troubleshoot STP and its variants on a switched network environment.
12.06	Configure and verify the bridge to optimize STP.
12.07	Establish and configure port priorities.
12.08	Troubleshoot and resolve issues with STP operations.
12.09	Manage router and switch OS software.
13.0	Demonstrate an understanding of basic wireless concepts and configuration. – The student will be able to:
13.01	Describe standards associated with wireless media, including IEEE, Wi-Fi Alliance, and ITU/FCC standards.
13.02	Identify and describe the purpose of the components in a small wireless network such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS).
13.03	Perform a site survey and identify common implementation issues.
13.04	Identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points.
13.05	Configure and verify WLAN design and functionality.
13.06	Describe and configure wireless security, including Wi-Fi Protected Access (WPA).
13.07	Describe and troubleshoot common wireless-network implementation issues such as interference and misconfiguration.
14.0	Demonstrate an understanding of wide area networks (WAN). – The student will be able to:
14.01	Describe WAN and MAN topologies.
14.02	Differentiate between WAN and LAN topologies.
14.03	Identify and describe WAN protocols.
14.04	Describe the impact of applications (Voice Over IP, Video Over IP) on a network.
14.05	Identify major network issues associated with the Internet, intranets and extranets.
14.06	Explain the differences between the use of leased lines, packet-switched, and circuit-switched technologies.
14.07	Describe typical WAN links and discuss bandwidth considerations.
14.08	Identify and manage licensing.

15.0	Demonstrate WAN configuration skills. – The student will be able to:
15.01	Configure and verify Point-to-Point WAN connection.
15.02	Configure and verify a packet switched WAN connection.
15.03	Configure and verify a basic WAN serial connection, a PPP connection between routers, and Frame Relay.
15.04	Configure and verify a PPP connection between routers, and verify a Frame Relay between routers.
15.05	Troubleshoot WAN implementation issue.
15.06	Implement LAN/WAN connections, including virtual private networks (VPN), permanent virtual circuits (PVC), Frame Relay, tunneling, remote and mobile user access.
16.0	Demonstrate an understanding of network security. – The student will be able to:
16.01	Implement basic switch security measures such as port security, trunk access, and management VLANs.
16.02	Identify current network security threats and explaining how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications.
16.03	Describe the functions of common security appliances and applications.
16.04	Implement recommended security practices to secure network devices.
16.05	Discuss the functions of authentication servers.
16.06	Describe the function and use of Access Control Lists (ACLs).
16.07	Verify, monitor, and troubleshoot ACLs in a network environment.
17.0	Demonstrate an understanding of remote access. – The student will be able to:
17.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
17.02	Configure static and dynamic routing, Network Address Translation (NAT) and Internet Connection Sharing (ICS).
17.03	Configure remote access services, protocols and policies, conditions and settings.
17.04	Configure remote access Dial-In User Service (RADIUS).
17.05	Configure wireless clients with group policy.
17.06	Monitor and troubleshoot remote access and wireless connections.

18.0	Demonstrate an understanding of IP addressing services. – The student will be able to:
18.01	Describe the purpose and operation of DHCP and DNS in a networked environment.
18.02	Configure, verify, and troubleshoot DHCP and DNS operation on a router.
18.03	Describe the operation and use of NAT and Port Address Translation (PAT) to provide Internet access to Private IP Address networks.
18.04	Configure, verify, and troubleshoot NAT on a router, including static translation, use of IP Address pools, and sharing a public IP address on a router interface.
18.05	Describe the purpose and operation of IPv6.
18.06	Configure, verify, and troubleshoot IPv6 routing in a network.
19.0	Demonstrate an understanding of network maintenance, support and troubleshooting. – The student will be able to:
19.01	Identify, interpret and maintain network documentation, procedures and practices.
19.02	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
19.03	Follow standard operating procedures for troubleshooting hardware and software.
19.04	Manage, maintain and backup router and switch system and configuration files.
19.05	Recognize and resolve hardware and software configuration problems.
19.06	Identify and resolve common network problems at Layers 1, 2, 3, and 7 using a layered model approach. Describe the use and features of diagnostic test equipment.
19.07	Determine type of programs and procedures required to: baseline network performance, identify intrusion and unacceptable system use, identify performance issues, predict system failures, and optimize network availability.
19.08	Use network monitoring and management tools effectively to integrate and manage network resources.
19.09	Explain RMON and SNMP and their use in monitoring a network.
19.10	Configure network devices to send SNMP traps or alerts to network management systems.
19.11	Establish and document a network baseline.
19.12	Compare and analyze initial performance measurements with the availability of critical network devices and connections to determine the difference between abnormal behavior and proper network performance as the network grows or traffic patterns change.
19.13	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.

Network Security/Cybersecurity Specialization Standards	
08.0	Demonstrate proficiency in securing network infrastructures and protecting data. – The student will be able to:
08.01	Explain the major categories of computer crimes and attacks.
08.02	Identify vulnerabilities inherent in network devices, protocols and services.
08.03	Develop institutional security policies and practices in compliance with relevant governmental standards and regulations.
08.04	Implement protective measures in securing critical information assets.
08.05	Deploy various network security related equipment including, firewalls, intrusion prevention systems, and proxies.
08.06	Secure critical network services such as Directory Services, Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), and File Transfer Protocol (FTP).
08.07	Secure desktop client operating systems against viruses, malware and other malicious attacks.
08.08	Detect malicious and abnormal activities through logs, intrusion detection systems and other utilities and appliances.
09.0	Demonstrate proficiency in performing security penetration testing. – The student will be able to:
09.01	Assist an organization in evaluating their current security posture by identifying gaps in security.
09.02	Identify organizational compliance with regulatory and legislative Information Assurance (IA) requirements.
09.03	Identify physical and logical weaknesses in computers and networks as well as physical weaknesses and weaknesses in policies, procedures and practices relating to the network and the organization.
09.04	Test the network perimeter defense mechanisms to ensure safe cyber boundaries.
09.05	Simulate methods that intruders use to gain unauthorized access to an organization's networked systems and attempted to compromise them.
09.06	Deploy proprietary and/or open source tools to test known technical vulnerabilities in networked systems.
09.07	Determine which vulnerabilities are exploitable and the degree of information exposure or network control that the organization could expect an attacker to achieve after successfully exploiting vulnerability.
09.08	Recommend procedures to mitigate against discovered vulnerabilities and security gaps.
09.09	Prepare penetration testing deliverables including reports, documentations.
09.10	Model the ethics of a licensed Penetration Tester.
10.0	Demonstrate proficiency in responding to cybersecurity incidents. – The student will be able to:
10.01	Explain contingency planning and its components.
10.02	Collect data from logs and other resources to aid in detecting security incidents.

10.03	Assemble an incident response plan.
10.04	Recover from incidents by restoring services and processes.
10.05	Manage evidentiary data in an electronic environment.

Network Virtualization Specialization Standards	
08.0	Demonstrate an understanding of virtualization concepts. – The student will be able to:
08.01	Describe the purpose, uses and software features of computer virtualization.
08.02	Identify and describe virtualization products, applications and services.
08.03	Identify compatibility issues among hardware and software products.
08.04	Identify the elements necessary for a Virtual Desktop Infrastructure.
08.05	Explain the benefits and considerations for virtual storage, including local host disk, iSCSI SAN, Fibre Channel SAN, and NFS SAN.
08.06	Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
08.07	Describe backup, recovery, disaster recovery, business continuity, and replication concepts.
08.08	Describe the policies and profile management which restrict and allow features.
08.09	Identify and modify desktop catalogs, groups, and a master virtual machine.
09.0	Install and configure the virtualization server platform. – The student will be able to:
09.01	Install and configure the virtualization platform using Windows, Linux-based and Citrix applications.
09.02	Install and configure the virtualization environment to create a new farm or join an existing farm.
09.03	Automate virtual machine and cluster deployment.
09.04	Monitor and maintain license usage requirements and trends.
09.05	Manage virtualization networking and storage.
09.06	Manage user sessions from the administrative console.
09.07	Configure network connectivity and storage for the virtualization software.
10.0	Install, configure and manage virtualized clients. – The student will be able to:
10.01	Identify requirements for virtual machines according to task.
10.02	Configure the virtual environment and the virtual machine properties.
10.03	Install, configure and manage a virtual machine desktop client and a virtualized server.

10.04	Manually deploy and migrate virtual machines.
10.05	Configure and assign users to pooled virtual desktops and dedicated virtual desktops.
10.06	Convert physical machines to virtual machines.
10.07	Configure desktop resources for access by users.
10.08	Configure and monitor back up virtual machine data to shared storage.
10.09	Migrate, convert, and monitor virtual machines.
10.10	Create and update shared disks.
10.11	Optimize the end user experience.
11.0	Install, configure, and maintain a virtualized application. – The student will be able to:
11.01	Install and configure a virtualized application.
11.02	Configure virtualization applications to use a proxy.
11.03	Configure virtualized application resources for access by users.
11.04	Install and use profiling software on a virtualized application for streaming, and linking dependent profiles to allow interaction between streamed applications.
11.05	Monitor virtualization applications and implementing policies.
11.06	Migrate, convert, and monitor virtual appliances.
11.07	Test policies to verify the achievement of the desired effect.
11.08	Configure and deliver a plug-in package, and verifying that self-service applications can be added from a client device.
11.09	Install and configure provisioning services.
11.10	Optimize a provisioning services server.
11.11	Optimize the end user experience.
12.0	Demonstrate proficiency in managing a virtualization infrastructure. – The student will be able to:
12.01	Manage user access to virtualized applications and machines in the virtualization infrastructure.
12.02	Manage the infrastructure to provide high availability and data access.

12.03	Administer the virtualization environment using Windows, Linux or Citrix software.
12.04	Describe tools that can be used to monitor virtualization application servers and sessions.
12.05	Manage and maintain network infrastructure and storage resources.
12.06	Create and apply worker groups.
12.07	Configure and optimize load management.
12.08	Configure a resource pool for optimal performance.
12.09	Troubleshoot infrastructure problems and virtual environment issues.
12.10	Resolve application compatibility issues.
12.11	Optimize the end user experience.
13.0	Demonstrate proficiency in securing a virtualization infrastructure. – The student will be able to:
13.01	Secure all elements of a full virtualization solution and maintain their security.
13.02	Restrict and protect administrator access to the virtualization solution.
13.03	Ensure that the hypervisor, the central program that runs the virtual environment, is properly secured.
13.04	Carefully plan the security for a full virtualization solution before installing, configuring and deploying it.

Digital Forensics Specialization Standards	
08.0	Demonstrate proficiency in basic and advanced security concepts. – The student will be able to:
08.01	Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications.
08.02	Describe the basic categories of vulnerabilities associated with cybersecurity (i.e., hardware, software, network, human, physical, organizational).
08.03	Describe the role of certificates and their role in cybersecurity.
08.04	Describe network-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature).
08.05	Describe the use of firewalls and other means of intrusion prevention.
08.06	Describe security design principles and their role in limiting points of vulnerability.
08.07	Discuss authentication methods and strategies.
08.08	Describe the processes involved in hardening a computer system or network.
08.09	Compare and contrast the forms, limitations, and vulnerabilities associated with centralized and decentralized key management schemas, including the PKI web of trust model.
08.10	Evaluate an existing security posture and identify gaps and vulnerabilities in security.
08.11	Describe the types of penetration tests (i.e., human, physical, wireless, data networks, telecommunications), the goals of each type, the metrics tested, and the value of their results.
08.12	Compare and contrast the processes of black box versus white box penetration testing, including their characteristics, limitations, and appropriateness.
08.13	Describe common testing methodologies and standards used in penetration testing.
08.14	Describe the activities that make up the Preparation Phase of the Incident Response Life Cycle, including identification of useful tools and resources.
08.15	Describe the range of testing/evaluation and associated tools used to monitor mitigation control effectiveness.
08.16	Create a risk management framework.
08.17	Describe the purpose and scope of an Information Systems Contingency Plan (ISCP).
08.18	Identify the five main components of a contingency plan (i.e., Supporting Information, Activation and Notification, Recovery, Reconstitution, and Appendices).
08.19	Describe the purpose and scope of a cybersecurity disaster recovery plan.
08.20	Describe the purpose and scope of a cybersecurity business continuity plan.

08.21	Describe the four phases of forensic analysis and discuss the activities performed in each phase.
08.22	Describe the forensic and evidentiary considerations when determining containment.
08.23	Describe the types and sources of data collected for forensic analysis.
08.24	Explain the various forms of data and associated collection/retrieval tools for the application transport, IP, and link layers.
08.25	Describe the essential elements of forensic analysis.
09.0	Demonstrate proficiency in managing hardware involved in imaging and data collection activities. – The student will be able to:
09.01	Discuss the different types of Motherboard Connections.
09.02	Explain the components that comprise a Motherboard and their functions.
09.03	Describe the different types of permanent storage.
09.04	Compare and contrast the different host interface standards.
09.05	Describe the storage processes of Solid State drives.
09.06	Discuss the different types of removable media and their impacts on data collection.
09.07	Explain the concepts of RAID including the different Levels and their impacts on the imaging and collection process.
09.08	Compare and contrast the read/write process of both permanent and temporary storage devices.
09.09	Compare the standard Boot process to the Forensic/controlled boot process.
10.0	Demonstrate proficiency in analyzing common file systems. – The student will be able to:
10.01	Define the Master Boot Record and discuss its purpose and any important items that it may contain.
10.02	Explain the purpose of the Boot Parameter Block (BPB) and its components.
10.03	Discuss the different File Systems available in the Windows OS environment. Identify the strengths and weaknesses of each system.
10.04	Explain the process of file creation and deletion in a Windows environment including the concept of file artifacts.
10.05	Discuss the formatting process in a Windows environment.
10.06	Explain pertinent Windows OS system files related to data storage and their functions.
10.07	Examine and identify the parts of the Windows Registry.

10.08	Discuss the how Windows handles the concept of Date and Time in relation to file management.
10.09	Compare non-Windows based file systems and their advantages/disadvantages.
10.10	Define the different file systems that can be used with removable media.
10.11	Explain the concepts of Open and Closed sessions.
11.0	Demonstrate proficiency in performing computer forensics investigations. – The student will be able to:
11.01	Create security incident handling and response policies.
11.02	Recover deleted, encrypted, or damaged file information as evidence for prosecution in computer crimes such as industrial espionage, E-mail fraud, and possession of pornography.
11.03	Deploy proprietary and/or open source tools to identify an intruder's footprints.
11.04	Coordinate incident response activities in cooperation with law enforcement agencies.
11.05	Prepare proper documentations of chain of custody, accounting for where each evidence item originated from, where it is going, and what entity has possession of the evidence.
11.06	Preserve forensic integrity of evidence so they can be admissible in court.
11.07	Model highest moral and ethical standards in conducting digital forensics investigations.
12.0	Demonstrate proficiency in performing mobile device forensics. – The student will be able to:
12.01	Preserve, acquire, and examine data stored on mobile devices.
12.02	Perform forensic acquisition and examination of SIM cards.
12.03	Apply forensic principles and tools to some of the most popular smart phones.
12.04	Demonstrate proficiency in using open-source and proprietary mobile device forensics tools.
12.05	Compare forensic acquisition tools and validate the completeness and accuracy of results.
12.06	Model forensic acquisition and examination of GPS navigation devices.
12.07	Utilize the results from mobile device forensics for internal investigations or in civic/criminal litigation.
13.0	Demonstrate proficiency in incident handling and response. – The student will be able to:
13.01	Design an incident response plan including: assessment, communication, containment, evaluation, recovery, and documentation.
13.02	Model information-hiding techniques.

	13.03 Collect, seize, and protect evidence.
	13.04 Recover data from various storage devices after physical and/or logical damage.
	13.05 Search memory in real time with live and system forensics.
	13.06 Investigate network traffic using log files, time analysis, sniffers, and other traffic analysis tools.
	13.07 Explain the legal considerations to investigating E-mails as prescribed in the Electronic Communications Privacy Act.
	13.08 Model email tracing techniques in forensic investigations.
14.0	Identify key pieces of legislation and processes related to digital forensics. – The student will be able to:
	14.01 Describe the importance of creating an accurate representation of the facts.
	14.02 Explain the components of the Discovery Process.
	14.03 Discuss the 4th Amendment and its impact on the digital forensics investigative process.
	14.04 Identify laws and court cases related to computer forensics and their impacts on the investigation process.
	14.05 Identify and explain the basic Federal Rules of Evidence.
	14.06 Compare and contrast the different qualifications required to be a licensed computer forensics professional from state to state.
	14.07 Define the concept of a subpoena and explain the process of how one is obtained.
	14.08 Explain the steps required to acquire a search warrant.
	14.09 Discuss the concept of consent and the ways that it can be granted.
	14.10 Compare the legal process for civil and criminal cases.
	14.11 Define the concept of expert testimony and the process involved in being classified as an expert.
	14.12 Discuss appropriate courtroom behavior.
15.0	Understanding of the tasks related to the casework process. – The student will be able to:
	15.01 Explain the steps involved in maintaining the integrity of digital evidence.
	15.02 Discuss the process of creating a forensics image.
	15.03 Define hashing and explain its uses in ensuring image authenticity.

15.04	Describe sector slack space and its potential impact on evidence gathering.
15.05	Describe the importance of documenting the examination process.
15.06	Explain the concept of control/security access logs for images and their importance in maintaining evidence.
15.07	Describe the steps involved in preparing evidence and documents for trial.
15.08	Explain the procedures involved in creating a digital forensics investigation report including examples of report formats.
15.09	Discuss the importance of the Summation and Analysis sections of the digital investigation report.

IP Communications Specialization Standards	
08.0	Demonstrate an understanding of IP Communication theory. – The student will be able to:
	08.01 Describe the supported multivendor hardware platforms for VoIP technology, their limits, and their boundaries.
	08.02 Describe how Voice Gateways function in an IP Telephony (IPT) solution.
	08.03 Identify and describe the Local Area Network (LAN) switching products useable in an IPT solution.
09.0	Demonstrate an understanding of digitizing voice traffic and voice compression standards. – The student will be able to:
	09.01 Identify the steps required for analog to digital conversion in a VoIP network.
	09.02 Identify the signaling steps required to complete a Public Switched Telephone Network (PSTN) call.
	09.03 Define the function of Private Branch eXchanges (PBX) or key systems.
	09.04 Configure Foreign eXchange Subscriber (FXS) and Foreign eXchange Office (FXO) interfaces on a Voice Gateway.
10.0	Demonstrate an understanding of Quality of Service (QoS) requirements in a converged data and voice network. – The student will be able to:
	10.01 Identify the steps required to minimize jitter, packet loss and serialization delay in a VoIP network.
	10.02 Explain the function of IP precedence and different Class of Service (CoS) types.
	10.03 Identify and list the types of traffic coming into the interface and defining their relative priority.
	10.04 Configure a priority or custom queuing list.
11.0	Demonstrate an understanding of IP communications design. – The student will be able to:
	11.01 Identify the most appropriate gateway in IP Communication design.
	11.02 Identify and describe dial plan architecture in IP Communication design.
	11.03 Identify the correct route patterns, filters, and use of wild cards in VoIP design scenarios.
	11.04 List available classes of services in IP Communication design and their constraints.
	11.05 Describe how to use digit manipulation in VoIP design.
	11.06 Identify the appropriate QoS tools that are needed for the proper operation of voice traffic on a network.

12.0	Demonstrate an understanding of troubleshooting procedures for IP communications. – The student will be able to:
	12.01 Identify the appropriate method for providing redundancy in VoIP design.
	12.02 Describe the tools used in troubleshooting IP communication networks.
	12.03 Identify and describing the different call flows and series of events through the call traces and debug outputs when troubleshooting.
	12.04 List the alarms used in IP communication troubleshooting.
13.0	Demonstrate an understanding of utilizing advanced Voice over IP (VoIP) and Data Bundle solutions to provide a single network connection for phone services and high-speed Internet. – The student will be able to:
	13.01 Identify the required bandwidth speeds needed for uninterrupted service and fast uploads and downloads.
	13.02 Describe the impact of Voice Samples, Codecs, and Packet Size on Bandwidth.
	13.03 Describe on demand use of voice/data and voice prioritization, delivered over a private/secure line.
	13.04 Describe features for a VoIP and Data Bundle.
	13.05 Describe VoIP and Data Bundle used to dynamically alternate between voice and Internet as call volume needs dictate.
14.0	Demonstrate an understanding of using *Statistical Analysis System (*SAS) sessions to exchange data by using the TCP/IP communications access method. – The student will be able to:
	14.01 Identify that a SAS/SHARE server ID has been added to the TCP/IP SERVICES file.
	14.02 Describe how to invoke SAS sessions utilizing TCP/IP communications access method.
	14.03 Describe syntax used to identify port numbers, defined in the client TCP/IP SERVICES file.
15.0	Demonstrate how to configure VoIP fax applications for universal access servers. – The student will be able to:
	15.01 Describe fax applications that enable universal access servers to send and receive faxes across packet-based networks using modems.
	15.02 Describe universal inbox applications for fax and e-mail and how faxes and e-mails can go to the same mailbox using direct inward dialing.
	15.03 Describe how faxes can be broadcast to multiple recipients simultaneously.
16.0	Demonstrate an understanding of key concepts for Video over IP. – The student will be able to:
	16.01 Describe video over IP systems using existing standards to reduce the data to a bitstream and then an IP network to carry the encapsulated data in a stream of IP packets.
	16.02 Describe the quality of service requirements which must be fulfilled for use in broadcast carrying video over IP networks.
	16.03 Describe bandwidth requirements, the maximum allowable packet loss rate, and approaches to achieve acceptable bandwidth such

	as quantity of service, network admission control, bandwidth reservation, traffic shaping, and traffic prioritization techniques.
16.04	Describe latency variation and its effect on making synchronization more complex by making the recovery of the underlying timing of the video signal far more difficult.

Advanced Network Infrastructure Specialization Standards	
08.0	Demonstrate an understanding of routing concepts. – The student will be able to:
08.01	Describe the purpose, architecture, and operations of a router.
08.02	Identify the hardware and software components of routers.
08.03	Explain the purpose and nature of routing tables.
08.04	Describe administrative distance and routing metrics such as hop counts and cost.
08.05	Describe how a router determines a path and switches packets.
08.06	Differentiate between static and dynamic routing.
08.07	Explain the differences between class-full and classless routing.
08.08	Describe the use and operation of Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
08.09	Describe how a network converges.
09.0	Demonstrate an understanding of routing protocols. – The student will be able to:
09.01	Describe the characteristics of distance vector routing protocols.
09.02	Describe the characteristics of link state routing protocols.
09.03	Describe the differences between distance vector and link state routing protocols, and determine the best routing protocol to use in a given situation.
09.04	Describe the features and operation of current internal and external routing protocols.
09.05	Determine network resources needed for implementing EIGRP in a network.
09.06	Create an EIGRP implementation plan.
09.07	Create an EIGRP verification plan.
09.08	Verify an EIGRP solution was implemented properly using show and debug commands.
09.09	Document the verification results for an EIGRP implementation.

10.0	Demonstrate router configuration skills. – The student will be able to:
10.01	Configure and verify router interfaces.
10.02	Perform basic router configuration and using the Command Line Interface (CLI) to inspect the operations of the router.
10.03	Design and implement a classless IP addressing scheme for a network.
10.04	Configure a router for RIP version 2 operation.
10.05	Use advanced configuration commands with routers.
10.06	Configure a router for OSPF routing in a network.
10.07	Configure EIGRP routing.
10.08	Fine-tune OSPF settings on a router, including the configuration of reference bandwidth, redistribution of static and default routes, and modification of OSPF intervals, in order to optimize network performance.
10.09	Verify and troubleshoot router operations in an OSPF network.
10.10	Configure and modify metric on a router to improve network performance.
10.11	Configure summarization and default route settings on a router to optimize network performance.
10.12	Verify and troubleshoot router operations in complex network environment.
10.13	Configure port security features.
10.14	Configure general switch security features.
10.15	Configure private VLANs.
10.16	Configure VACL and PACL.
11.0	Demonstrate an understanding of LAN design and concepts. – The student will be able to:
11.01	Identify the layers and functions of switched network architecture.
11.02	Describe the principles and benefits of a hierarchical network design.
11.03	Explain the technology and media access control method for Ethernet networks.
11.04	Describe the issues associated with Layer 2.
11.05	Describe the operation of a LAN switch.

	11.06	Describe the benefits of Virtual Local Area Networks (VLAN).
	11.07	Identify and describe the different VLAN encapsulation protocols and their operation.
	11.08	Describe the purpose and operation of VLAN Trunking Protocol (VTP) in the management of a switched network domain.
	11.09	Describe the purpose and operation of Spanning Tree Protocol (STP), and its variants.
	11.10	Describe the use of Inter-VLAN routing to connect different Networks in a switch-based network topology.
	11.11	Analyze business requirements and design a LAN structure to meet those requirements.
	11.12	Discuss quality-of-service considerations and switching prioritization.
	11.13	Implement a VoIP support solution.
	11.14	Implement video support solution.
12.0	Demonstrate VLAN configuration skills. – The student will be able to:	
	12.01	Perform and verify initial LAN switch configuration tasks including remote access management, switch port modes, and trunks.
	12.02	Configure, verify, and troubleshoot VLANs on a LAN switch.
	12.03	Implement a VLAN Domain by configuring LAN switches for VTP network operation.
	12.04	Configure a Router to provide Inter-VLAN routing using multiple physical interfaces, and on a single physical interface with sub-interfaces.
	12.05	Configure and troubleshoot Spanning Tree Protocol and its variants on a switched network environment.
	12.06	Configure and verify the bridge to optimize STP.
	12.07	Establish and configure port priorities.
	12.08	Troubleshoot and resolve issues with STP operations.
	12.09	Manage router and switch Operating System software.
	12.10	Create a Layer 3 path control implementation plan based upon the results of the redistribution analysis.
	12.11	Create a Layer 3 path control verification plan.
	12.12	Configure Layer 3 path control.
	12.13	Verify that a Layer 3 path control was implemented.

12.14	Document results of a Layer 3 path control implementation and verification plan.
12.15	Implement basic teleworker and branch services.
12.16	Describe broadband technologies.
12.17	Configure basic broadband connections.
12.18	Describe basic VPN technologies.
12.19	Configure Generic Routing Encapsulation (GRE).
12.20	Describe branch access technologies.
12.21	Configure private VLANs.
12.22	Configure VACL and PACL.
12.23	Configure switch-to-switch connectivity for the VLAN based solution.
12.24	Configure loop prevention for the VLAN based solution.
12.25	Configure Access Ports for the VLAN based solution.
12.26	Determine network resources needed for implementing a VLAN based solution on a network.
12.27	Create a VLAN based implementation plan.
12.28	Create a VLAN based verification plan.
12.29	Verify the VLAN based solution was implemented properly using show and debug commands.
12.30	Document the verification after implementing a VLAN solution.
13.0	Demonstrate an understanding of basic wireless concepts and configuration. – The student will be able to:
13.01	Describe standards associated with wireless media, including IEEE, Wi-Fi Alliance, and ITU/FCC standards.
13.02	Identify and describe the purpose of the components in a small wireless network, such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS).
13.03	Perform a site survey and identify common implementation issues.
13.04	Identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points.
13.05	Configure and verify WLAN design and functionality.
13.06	Describe and configure wireless security, including Wi-Fi Protected Access (WPA).

13.07	Describe and troubleshoot common wireless-network implementation issues such as interference and misconfiguration.
13.08	Implement a wireless extension of a Layer 2 solution.
14.0	Demonstrate an understanding of wide area networks (WAN). – The student will be able to:
14.01	Describe WAN and MAN topologies.
14.02	Differentiate between WAN and LAN topologies.
14.03	Identify and describe WAN protocols.
14.04	Describe the impact of applications (Voice Over IP, Video Over IP) on a network.
14.05	Identify major network issues associated with the Internet, intranets and extranets.
14.06	Explain the differences between the use of leased lines, packet-switched, and circuit-switched technologies.
14.07	Describe typical WAN links and discuss bandwidth considerations.
14.08	Identify and manage licensing.
14.09	Document results of a redistribution, implementation, and verification plan.
14.10	Identify the differences between implementing an IPv4 and IPv6 redistribution solution.
14.11	Determine network resources needed for implementing high availability on a network.
14.12	Document results of high availability implementation and verification.
15.0	Demonstrate Wide Area Network configuration skills. – The student will be able to:
15.01	Configure and verify Point to Point WAN connection.
15.02	Configure and verify a Packet Switched WAN connection.
15.03	Configure and verify a basic WAN serial connection, a PPP connection between routers, and Frame Relay.
15.04	Configure and verify a PPP connection between routers, and Configure and verify a Frame Relay between routers.
15.05	Troubleshoot WAN implementation issues.
15.06	Implement LAN/WAN connections, including virtual private networks (VPN), permanent virtual circuits (PVC), frame relay, tunneling, remote and mobile user access.

15.07	Create a redistribution implementation plan based upon the results from a redistribution analysis.
15.08	Create a redistribution verification plan.
15.09	Configure a redistribution solution.
15.10	Verify that a redistribution was implemented.
15.11	Create a high availability implementation plan.
15.12	Create a high availability verification plan.
15.13	Implement first hop redundancy protocols.
15.14	Implement switch supervisor redundancy.
15.15	Verify high availability solution was implemented properly using show and debug commands.
16.0	Demonstrate an understanding of network security. – The student will be able to:
16.01	Implement basic switch security measures such as port security, trunk access, and management VLANs.
16.02	Identify current network security threats and explaining how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications.
16.03	Describe the functions of common security appliances and applications.
16.04	Implement recommended security practices to secure network devices.
16.05	Discuss the functions of authentication servers.
16.06	Describe the function and use of Access Control Lists (ACLs).
16.07	Verify, monitor, and troubleshoot ACLs in a network environment.
16.08	Determine network resources needed for implementing a security solution.
16.09	Create an implementation plan for the security solution.
16.10	Create a verification plan for the security solution.
16.11	Verify the Security based solution was implemented properly using show and debug commands.
16.12	Document the verification results after implementing a Security solution.

	16.13 Configure port security features.
	16.14 Configure general switch security features.
17.0	Demonstrate an understanding of Remote Access. – The student will be able to:
	17.01 Compare and contrast remote access protocols, wireless standards and network authentication methods.
	17.02 Configure static and dynamic routing, NAT and Internet Connection Sharing (ICS).
	17.03 Configure remote access services, protocols and policies, conditions and settings.
	17.04 Configure Remote Access Dial-In User Service (RADIUS).
	17.05 Configure wireless clients with group policy.
	17.06 Monitor and troubleshoot remote access and wireless connections.
18.0	Demonstrate an understanding of IP Addressing Services. – The student will be able to:
	18.01 Describe the purpose and operation of DHCP and DNS in a networked environment.
	18.02 Configure, verify, and troubleshoot DHCP and DNS operation on a router.
	18.03 Describe the operation and use of NAT and Port Address Translation (PAT) to provide Internet access to Private IP Address networks.
	18.04 Configure, verify, and troubleshoot NAT on a router, including static translation, use of IP Address pools, and sharing a public IP address on a router interface.
	18.05 Describe the purpose and operation of IPv6.
	18.06 Configure, verify, and troubleshoot IPv6 routing in a network.
	18.07 Determine network resources needed for implementing IPv6 on a network.
	18.08 Create an IPv6 implementation plan.
	18.09 Create an IPv6 verification plan.
	18.10 Configure IPv6 routing.
	18.11 Configure IPv6 interoperation with IPv4.
	18.12 Verify IPv6 solution was implemented properly using show and debug commands.
	18.13 Document verification results for an IPv6 implementation plan.

19.0	Demonstrate an understanding of network maintenance, support and troubleshooting. – The student will be able to:
19.01	Identify, interpret and maintain network documentation, procedures and practices.
19.02	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
19.03	Follow standard operating procedures for troubleshooting hardware and software.
19.04	Manage, maintain and backup router and switch system and configuration files.
19.05	Recognize and resolve hardware and software configuration problems.
19.06	Identify and resolve common network problems at layers 1, 2, 3, and 7 using a layered model approach. Describe the use and features of diagnostic test equipment.
19.07	Determine type of programs and procedures required to: baseline network performance, identify intrusion and unacceptable system use, identify performance issues, predict system failures, and optimize network availability.
19.08	Use network monitoring and management tools effectively to integrate and manage network resources.
19.09	Explain RMON and SNMP and their use in monitoring a network.
19.10	Configure network devices to send SNMP traps or alerts to network management systems.
19.11	Establish and document a network baseline.
19.12	Compare and analyze initial performance measurements with the availability of critical network devices and connections to determine the difference between abnormal behavior and proper network performance as the network grows or traffic patterns change.
19.13	Optimize traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.
19.14	Determine network resources needed for implementing a switch based Layer 3 solution.
19.15	Create an implementation plan for the switch based Layer 3 solution.
19.16	Create a verification plan for the switch based Layer 3 solution.
19.17	Configure routing interfaces.
19.18	Configure Layer 3 security.
19.19	Verify the switch based Layer 3 solution was implemented properly using show and debug commands.
19.20	Document the verification results after implementing a switch based Layer 3 solution.
19.21	Develop a plan to monitor and manage a network.

19.22 Perform network monitoring using IOS tools.
19.23 Perform routine IOS device maintenance.
19.24 Isolate sub-optimal internetwork operation at the correctly defined OSI Model layer.
19.25 Troubleshoot EIGRP.
19.26 Troubleshoot OSPF.
19.27 Troubleshoot eBGP.
19.28 Troubleshoot routing redistribution solution.
19.29 Troubleshoot a DHCP client and server solution.
19.30 Troubleshoot NAT.
19.31 Troubleshoot first hop redundancy protocols.
19.32 Troubleshoot IPv6 routing.
19.33 Troubleshoot IPv6 and IPv4 interoperability.
19.34 Troubleshoot switch-to-switch connectivity for the VLAN based solution.
19.35 Troubleshoot loop prevention for the VLAN based solution.
19.36 Troubleshoot access ports for the VLAN based solution.
19.37 Troubleshoot private VLANS.
19.38 Troubleshoot port security.
19.39 Troubleshoot general switch security.
19.40 Troubleshoot VACLs and PACLs.
19.41 Troubleshoot switch virtual interfaces (SVIs).
19.42 Troubleshoot switch supervisor redundancy.
19.43 Troubleshoot switch support of advanced services (i.e., Wireless, VoIP, Video).
19.44 Troubleshoot a VoIP support solution.

19.45	Troubleshoot a video support solution.
19.46	Troubleshoot Layer 3 security.
19.47	Troubleshoot issues related to ACLs used to secure access to Cisco routers.
19.48	Troubleshoot configuration issues related to accessing the AAA server for authentication purposes.
19.49	Troubleshoot security issues related to IOS services (i.e., finger, NTP, HTTP, FTP, RCP).

Linux System Administrator Specialization Standards	
08.0	Understand and use essential tools. – The student will be able to:
08.01	Access a shell prompt and issue commands with correct syntax.
08.02	Use input-output redirection (>, >>, |, 2>, etc.).
08.03	Use grep and regular expressions to analyze text.
08.04	Access remote systems using ssh.
08.05	Log in and switch users in multiuser targets.
08.06	Archive, compress, unpack, and uncompress files using a variety of tools.
08.07	Create and edit text files.
08.08	Create, delete, copy, and move files and directories.
08.09	Create hard and soft links.
08.10	List, set, and change standard ugo/rwx permissions.
08.11	Locate, read, and use system documentation including man, info, and files in /usr/share/doc.
09.0	Operate running systems. – The student will be able to:
09.01	Boot, reboot, and shut down a system normally.
09.02	Boot systems into different targets manually.
09.03	Interrupt the boot process in order to gain access to a system.
09.04	Identify CPU/memory intensive processes, adjust process priority with renice, and kill processes.
09.05	Locate and interpret system log files and journals.
09.06	Perform various logging related activities such as configuring logging, log rotation and log reporting.
09.07	Access a virtual machine's console.
09.08	Discuss metric storage, collection, and display.
09.09	Explain the meaning and use of common metrics such as utilization values for CPU, memory, disk space, disk I/O, and network bandwidth.

	09.10 Start and stop virtual machines.
	09.11 Start, stop, and check the status of network services.
	09.12 Securely transfer files between systems.
10.0	Configure local storage. – The student will be able to:
	10.01 List, create, delete partitions on MBR and GPT disks.
	10.02 Create and remove physical volumes, assign physical volumes to volume groups, and create and delete logical volumes.
	10.03 Configure systems to mount file systems at boot by Universally Unique ID (UUID) or label.
	10.04 Create, use and remove snapshots of logical volumes.
	10.05 Add new partitions and logical volumes, and swap to a system non-destructively.
	10.06 Describe the differences between hard disks and solid-state disks, and issues related to both.
	10.07 Compare different RAID levels.
	10.08 Identify the features of Storage Area Networks (SANS) and Network Area Storage (NAS) and the common uses of these storage solutions.
11.0	Create and configure file systems. – The student will be able to:
	11.01 Create, mount, unmount, and using various file systems.
	11.02 Mount and unmount CIFS and NFS network file systems.
	11.03 Extend existing logical volumes.
	11.04 Create and configure set-GID directories for collaboration.
	11.05 Create and manage Access Control Lists (ACLs).
	11.06 Diagnose and correct file permission problems.
12.0	Deploy, configure, and maintain systems. – The student will be able to:
	12.01 Configure networking and hostname resolution statically or dynamically.
	12.02 Schedule tasks using at and cron.
	12.03 Start and stop services and configure services to start automatically at boot.

12.04	Configure systems to boot into a specific target automatically.
12.05	Perform an unattended system install.
12.06	Configure a physical machine to host virtual guests.
12.07	Install Linux systems as virtual guests.
12.08	Configure systems to launch virtual machines at boot.
12.09	Configure network services to start automatically at boot.
12.10	Configure a system to use time services.
12.11	Install and update software packages from a remote repository or a local file system.
12.12	Update the kernel package appropriately to ensure a bootable system.
12.13	Modify the system bootloader.
13.0	Manage users and groups. – The student will be able to:
13.01	Create, delete, and modify local and global user accounts.
13.02	Change passwords and adjust password aging for local and global user accounts.
13.03	Create, delete, and modify local and global groups and group memberships.
13.04	Configure a system to use an existing authentication service for user and group information.
14.0	Manage security. – The student will be able to:
14.01	Describe security basic concepts and mechanisms, including encryption, password safety, message digests and system security requirements.
14.02	Practice proper security techniques and monitoring.
14.03	Configure firewall settings using firewall-config, firewall-cmd, or iptables.
14.04	Configure key-based authentication for SSH.
14.05	Set enforcing and permissive modes for SELinux.
14.06	List and identify SELinux file and process context.
14.07	Restore default file contexts.

14.08 Use boolean settings to modify system SELinux settings.
14.09 Diagnose and address routine SELinux policy violations.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Network Server Administration (0511100112) – Primary/Secondary: 24/18 hours
Network Enterprise Administration (0511100113) – Primary/Secondary: 29/26 hours
Network Infrastructure (0511100114) – Primary/Secondary: 21/16 hours
Advanced Network Infrastructure (0511100115) – Primary/Secondary: 36/28 hours
Network Virtualization (0511100116) – Primary: 24/18 hours
Advanced Network Virtualization (0511100117) – Primary/Secondary: 34/27 hours
Network Security (0511100118) – Primary/Secondary: 30/20 hours
Digital Forensics (0511100119) – Primary/Secondary: 32/24 hours
IP Communications (0511100120) – Primary/Secondary: 32/21 hours
Network Support Technician (0511100121) – Primary/Secondary: 21/16 hours

Linux System Administrator (0511100122) – Primary/Secondary: 24/21 hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **IT Security**
Career Cluster: **Information Technology**

NOTE: This program has been daggered for deletion with 2016-2017 being the last cohort of students permitted to enroll in the program. After 2016-2017, no new students may be enrolled in this program. Students already enrolled in the program may, at the college's discretion, continue taking courses in the program until completion. IT Security 60 1511100307 will replace this program.

AS	
CIP Number	1511100306
Program Type	College Credit
Standard Length	63 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to work in Internet, intranet, extranet, and enterprise environments; installing, configuring, designing, and managing secure database and E-commerce resources

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 63 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of computer hardware.
02.0 Demonstrate an understanding of networked environments, hardware, and software.
03.0 Install and configure secure network systems software and utilities.
04.0 Demonstrate proficiency with Internet structure, organization, and navigation.
05.0 Demonstrate an understanding of network access control systems and methodology.
06.0 Describe cryptography concepts, standards, and applications.
07.0 Perform telecommunications and network security activities.
08.0 Demonstrate an understanding of Database Management Systems (DBMS).
09.0 Perform administrative tasks related to database security.
10.0 Demonstrate an understanding of E-commerce.
11.0 Perform tasks related to e-commerce security.
12.0 Perform web site management activities.
13.0 Design and implement physical security measures.
14.0 Perform operation and security management practices.
15.0 Employ applications and systems development security techniques.
16.0 Develop business continuity and disaster recovery plans.
17.0 Describe ethical issues, pertinent laws, and how to conduct investigations.
18.0 Perform general organizational computing workplace competencies.
19.0 Perform project planning and management activities.
20.0 Perform documentation and technical reference activities.
21.0 Demonstrate employability skills.
22.0 Demonstrate professional development skills.

Florida Department of Education
Student Performance Standards

Program Title: **IT Security**
CIP Number: **1511100306**
Program Length: **63 credit hours**
SOC Code(s): **15-1122**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:
01.0 Demonstrate an understanding of computer hardware. – The student will be able to:
01.01 Describe multiple numbering systems used to represent instructions and data.
01.02 Identify the architecture of major hardware platforms.
01.03 Describe the functions of major hardware components of a computer system.
01.04 Discuss the potential impact of emerging hardware technologies.
01.05 Perform preventive maintenance tasks on microcomputer systems.
01.06 Set up and configure computer systems and peripherals.
01.07 Configure the Basic Input/Output System (BIOS) of a computer system.
01.08 Install and configure storage devices, controllers, and network interfaces.
02.0 Demonstrate an understanding of networked environments, hardware, and software. – The student will be able to:
02.01 Discuss fundamental network concepts such as topology, protocols, architecture, and internetworking.
02.02 Define all layers in the Open Systems Interconnect (OSI) and Transmission Control Protocol/Internetworking Protocol (TCP/IP) network protocol models.
02.03 Discuss the nature of Internetworking Protocol (IP) addresses and Media Access Control (MAC) addresses, and mapping between protocol addressing schemes.
02.04 Describe the functions and hardware requirements for current popular network servers for such services as: Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), email, the World Wide Web (WWW), and proxy.
02.05 Describe the major functions and hardware requirements of network client hardware components.
02.06 Describe current link technologies such as twisted-pair, coaxial, fiber optic, and wireless.

02.07	Describe the major functions of network connectivity hardware.
02.08	Describe the function of network storage devices, storage area networks (SAN), and other peripherals.
03.0	Install and configure secure network systems software and utilities. – The student will be able to:
03.01	Install and configure current leading system software, drivers, and service packs.
03.02	Install, configure and set up a proxy server and a gateway.
03.03	Discuss the functions of authentication protocols and Virtual Private Networks (VPNs).
03.04	Install and configure web servers and related services.
03.05	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.06	Install and configure a secure desktop client operating system (OS).
03.07	Describe modifications necessary to an OS such as modifying parameters and how to handle conflicting interrupts when installing, configuring, and upgrading typical applications software.
03.08	Install and configure client software for network-based applications such as email, web browsing, terminal emulation, file transfer, group conferencing and database.
03.09	Install and configure current popular network servers for such services as: Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), email, the World Wide Web (WWW) and proxy service.
04.0	Demonstrate proficiency with Internet structure, organization, and navigation. – The student will be able to:
04.01	Describe Internet structure and administration, including such topics as Requests for Comments (RFCs) and the Domain Name System (DNS).
04.02	Describe common Internet services and port numbers.
04.03	Demonstrate the use of internetworking protocols.
04.04	Differentiate between push and pull technologies.
04.05	Demonstrate the use of typical remote access mechanisms.
04.06	Describe the data format and proprietary nature of commonly used Internet file types.
04.07	Demonstrate use of Internet clients and services.
05.0	Demonstrate an understanding of network access control systems and methodology. – The student will be able to:
05.01	Specify by access control mechanisms what users can do, which resources they can access, and what operations they can perform on a system.
05.02	Compare and contrast access control techniques.

05.03	Administer computer, group, and user accounts.
05.04	Manage policies, rights, permissions, and passwords for users and/or groups of users.
05.05	Demonstrate an understanding of various access control models.
05.06	Manage password, PIN selection, maintenance, and control.
05.07	Demonstrate an understanding of methods of identification and authentication.
05.08	Implement centralized/remote authentication access controls.
05.09	Implement and manage decentralized access controls such as domain and trust relationships.
05.10	Analyze methods of server attacks.
05.11	Demonstrate an understanding of the different types of intrusions and the different methods of intrusion detection.
05.12	Monitor the network using various forms of intrusion detection resources to detect attacks.
05.13	Investigate audit trails for signs of network intrusions.
05.14	Perform penetration testing to find weaknesses in the access control systems.
06.0	Describe cryptography concepts, standards, and applications. – The student will be able to:
06.01	Demonstrate an understanding of the encryption/decryption process.
06.02	Demonstrate an understanding of the basic functions involved in key management.
06.03	Utilize various forms of cryptography, digital certificates, and digital signatures to achieve confidentiality, integrity, authentication, and non-repudiation in an enterprise data communications network.
06.04	Discuss the creation and use of digital certificates and digital signatures to provide authentication of users and verification of data integrity in network communications.
06.05	Identify the strengths and weaknesses of cryptographic algorithms and the effects of key length.
06.06	Employ cryptographic algorithms.
06.07	Implement current popular key distribution methods.
06.08	Utilize application and network-based protocols.
06.09	Describe the use of security hardware components.
07.0	Perform telecommunications and network security activities. – The student will be able to:
07.01	Utilize protocol layering models.
07.02	Evaluate the security implications involved with the various physical media types.

07.03	Describe security concerns with using various network topologies.
07.04	Configure authentication protocol service that provide dial-in authentication and security.
07.05	Employ network monitors and packet sniffers to identify security threats.
07.06	Implement security measures using network hardware and software.
07.07	Discuss the security vulnerabilities of the TCP/IP protocol stack.
07.08	Configure Network Layer security protocols.
07.09	Configure Transport Layer security protocols.
07.10	Utilize Application Layer security protocols.
07.11	Perform connection verification using current authentication protocols.
07.12	Demonstrate an understanding of how wide area network serial line protocols work.
07.13	Implement secure data communication techniques.
07.14	Develop secure email, facsimile, and voice communication procedures to protect against network attacks.
07.15	Employ alarms and signals to alert network security administrators of intrusions.
08.0	Demonstrate an understanding of Database Management Systems (DBMS). – The student will be able to:
08.01	Compare the major types of databases.
08.02	Describe relational database concepts.
08.03	Analyze the various components of a DBMS.
08.04	Install and configure database server software from leading vendors.
08.05	Perform database administration tasks using the Structured Query Language (SQL).
08.06	Demonstrate an understanding of transaction processing and concurrency control.
08.07	Perform database backup and recovery operations.
08.08	Employ techniques to ensure database integrity and security.
09.0	Perform administrative tasks related to database security. – The student will be able to:
09.01	Develop database security guidelines.
09.02	Monitor database security systems.

09.03	Manage web database security.
09.04	Verify security compliance.
09.05	Secure backup processes.
09.06	Verify backup processes.
10.0	Demonstrate an understanding of e-commerce. – The student will be able to:
10.01	Describe e-commerce and its impact on business and society.
10.02	Differentiate between the various e-commerce business models.
10.03	Describe the development of an e-commerce business plan.
10.04	Discuss e-commerce revenue streams and e-commerce market sectors.
10.05	Develop e-commerce marketing plan.
10.06	Discuss the steps necessary to maintain transaction integrity.
10.07	Identify components and procedures necessary to process credit card transactions.
10.08	Describe applicability of and compliance with Payment Card Industry Data Security Standards (PCI-DSS).
11.0	Perform tasks related to e-commerce security. – The student will be able to:
11.01	Manage digital certificates.
11.02	Maintain integrity in transaction storage and reporting systems.
11.03	Protect credit card, personal, banking, and bill to/ship to information in transaction processes.
11.04	Oversee inventory control.
11.05	Maintain email security related to e-commerce.
11.06	Review third-party transaction processing.
11.07	Assist in evaluating e-commerce platform vulnerabilities.
12.0	Perform webserver and site management activities. – The student will be able to:
12.01	Describe the process of obtaining an Internet domain name and mapping it to an Internet Protocol (IP) address.
12.02	Compare features of currently available web site management tools.

12.03	Configure current web server software.
12.04	Use current web server software to maintain secure web sites.
12.05	Use web site access tracking and analysis tools to evaluate the security of a web server.
13.0	Design and implement physical security measures. – The student will be able to:
13.01	Identify physical threats to an enterprise's resources.
13.02	Diagnose an enterprise's physical vulnerabilities.
13.03	Specify possible countermeasures to physically protect an enterprise's resources and sensitive information.
13.04	Develop a list of physical facility requirements to secure the premises.
13.05	Evaluate the applicability of technical controls.
14.0	Perform operation and security management practices. – The student will be able to:
14.01	Perform personnel administrative security operations.
14.02	Implement client and network system security software on an enterprise-wide basis.
14.03	Ensure backups of critical information.
14.04	Protect the privacy of personal data.
14.05	Demonstrate proper handling of sensitive information and media.
14.06	Demonstrate an understanding of different control types.
14.07	Determine what enterprise resources require protection.
14.08	Compare the advantages and disadvantages of internal versus external audits.
14.09	Perform compliance checks on user adherence to security policies.
14.10	Identify different types of enterprise-wide monitoring tools and techniques.
14.11	Utilize enterprise-wide monitoring tools and techniques.
14.12	Implement countermeasures to defend against threats.
14.13	Perform penetration testing activities.
14.14	Understand principles of risk management and asset valuation.

14.15	Monitor enterprise-wide information for potential liabilities.
14.16	Manage software licenses and enforce compliance within the organization.
15.0	Employ applications and systems development security techniques. – The student will be able to:
15.01	Describe the stages of the system development life cycle.
15.02	Understand security implications of structured programming techniques.
15.03	Analyze the controls that are included within systems and applications software and those used in the development of agents, applets, software, databases, data warehouses and knowledge-based systems.
15.04	Implement features to ensure data and application integrity, security and availability.
15.05	Analyze distributed environment application issues.
15.06	Analyze local environment application issues.
15.07	Analyze key database and data warehousing issues.
15.08	Develop multilevel security schemes for databases and data warehouses.
15.09	Compare different forms of data/information storage.
15.10	Describe different aspects of application and database security control architectures.
15.11	Understand the difference between elevated privileges and user modes of operation.
15.12	Identify various levels of application integrity.
15.13	Describe the impact that malicious code plays in software development.
15.14	Formulate countermeasures to defend against or detect malicious code.
15.15	Establish a secure development environment.
16.0	Develop business continuity and disaster recovery plans. – The student will be able to:
16.01	Perform a business impact assessment.
16.02	Specify the necessary capabilities of alternative business sites.
16.03	Develop business continuity, disaster containment, and recovery plans.
16.04	Understand the impact of scheduled facility maintenance on enterprise systems.
16.05	Develop a testing program for business continuity/disaster recovery plans.
16.06	Develop a training program for personnel regarding business continuity/disaster recovery plans.

17.0	Describe ethical issues, pertinent laws, and how to conduct investigations. – The student will be able to:
17.01	Understand the major categories and types of laws as they relate to information security.
17.02	Understand institutional policies and practices regarding data privacy and intellectual property rights.
17.03	Describe abnormal and suspicious activity as it relates to information security.
17.04	Analyze potential data security threats.
17.05	Understand legal institutional policies and practices to protect against purposeful violations of data integrity.
17.06	Identify the major categories of computer crimes and attacks.
17.07	Understand institutional policies and practices to conduct an investigation of security violations.
17.08	Discuss major ethical and legal issues related to Internet and system use.
18.0	Perform general organizational computing workplace competencies. – The student will be able to:
18.01	Deliver and follow oral and written technical instructions.
18.02	Prepare and deliver a technical presentation.
18.03	Participate in group discussions as a member and as a leader.
18.04	Understand the importance of self-motivation and responsibility in completing assigned tasks.
18.05	List the steps in problem solving.
18.06	Identify and discuss issues contained within professional codes of conduct.
18.07	Discuss ethical aspects of intellectual property rights and licensing issues.
18.08	Identify potential sources of employee/employer or employee/employer conflict and discuss possible approaches to resolve such disagreements.
18.09	Use appropriate courtesy, manners, and dress in the workplace.
18.10	Apply principles and techniques for being a productive, contributing member of a team.
18.11	Identify and use acceptable strategies for resolving conflict in the workplace.
18.12	Apply principles and techniques for working productively with people of diverse cultures and backgrounds.
18.13	Identify techniques for stress management and prevention of job burnout.
18.14	Use appropriate communication skills, telephone etiquette, courtesy, and manners when dealing with individuals of a technical background.

19.0 Perform project planning and management activities. – The student will be able to:
19.01 Apply effective time management skills.
19.02 Describe appropriate measures for planning and managing a large project.
19.03 Define an implementation schedule for a large project.
19.04 Describe appropriate measures for planning and implementing corporate-wide upgrade of hardware and software.
19.05 Identify examples of effective end-user training strategies and techniques.
20.0 Perform documentation and technical reference activities. – The student will be able to:
20.01 Use technical vocabulary appropriately.
20.02 Locate information in printed and online technical references.
20.03 Prepare documentation to track assets, security-related activities, and incidents.
21.0 Demonstrate employability skills. – The student will be able to:
21.01 Identify sources of employment opportunities.
21.02 Discuss employer expectations regarding attendance, punctuality, initiative and teamwork.
21.03 Discuss employee rights regarding privacy, discrimination, due process and safety.
21.04 Explain the importance of a written job description.
21.05 Identify methods for securing employment references.
21.06 Compose a cover letter and a resume.
21.07 Complete an electronic employment application.
21.08 Classify behaviors considered appropriate or inappropriate in a job interview situation.
21.09 Demonstrate job interview skills.
21.10 Compose a follow-up letter.
21.11 Compose a letter of resignation.
22.0 Demonstrate professional development skills. – The student will be able to:
22.01 Discover corporate strategies and policies.
22.02 Understand the importance of participating in professional organizations and maintaining professional contacts.

22.03 Develop mentor relationships.
22.04 Anticipate future industry trends.
22.05 Describe options for continuing education.
22.06 Read industry journals and magazines.
22.07 Understand the importance of attending seminars, workshops, and tradeshows.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (63) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Database & E-commerce Security CCC (0511100311) – 18 credit hours.

Standards for the above certificate programs are contained in separate curriculum frameworks.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **IT Security (60)**
Career Cluster: **Information Technology**

AS	
CIP Number	1511100307
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to work in Internet, intranet, extranet, and enterprise environments; installing, configuring, designing, and managing secure database and E-commerce resources

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of computer hardware.
02.0 Demonstrate an understanding of networked environments, hardware, and software.
03.0 Install and configure secure network systems software and utilities.
04.0 Demonstrate proficiency with Internet structure, organization, and navigation.
05.0 Demonstrate an understanding of network access control systems and methodology.
06.0 Describe cryptography concepts, standards, and applications.
07.0 Perform telecommunications and network security activities.
08.0 Demonstrate an understanding of Database Management Systems (DBMS).
09.0 Perform administrative tasks related to database security.
10.0 Demonstrate an understanding of E-commerce.
11.0 Perform tasks related to e-commerce security.
12.0 Perform web site management activities.
13.0 Design and implement physical security measures.
14.0 Perform operation and security management practices.
15.0 Employ applications and systems development security techniques.
16.0 Develop business continuity and disaster recovery plans.
17.0 Describe ethical issues, pertinent laws, and how to conduct investigations.
18.0 Perform general organizational computing workplace competencies.
19.0 Perform project planning and management activities.
20.0 Perform documentation and technical reference activities.
21.0 Demonstrate employability skills.
22.0 Demonstrate professional development skills.

Florida Department of Education
Student Performance Standards

Program Title: **IT Security (60)**
CIP Number: **1511100307**
Program Length: **60 credit hours**
SOC Code(s): **15-1122**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:
01.0 Demonstrate an understanding of computer hardware. – The student will be able to:
01.01 Describe multiple numbering systems used to represent instructions and data.
01.02 Identify the architecture of major hardware platforms.
01.03 Describe the functions of major hardware components of a computer system.
01.04 Discuss the potential impact of emerging hardware technologies.
01.05 Perform preventive maintenance tasks on microcomputer systems.
01.06 Set up and configure computer systems and peripherals.
01.07 Configure the Basic Input/Output System (BIOS) of a computer system.
01.08 Install and configure storage devices, controllers, and network interfaces.
02.0 Demonstrate an understanding of networked environments, hardware, and software. – The student will be able to:
02.01 Discuss fundamental network concepts such as topology, protocols, architecture, and internetworking.
02.02 Define all layers in the Open Systems Interconnect (OSI) and Transmission Control Protocol/Internetworking Protocol (TCP/IP) network protocol models.
02.03 Discuss the nature of Internetworking Protocol (IP) addresses and Media Access Control (MAC) addresses, and mapping between protocol addressing schemes.
02.04 Describe the functions and hardware requirements for current popular network servers for such services as: Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), email, the World Wide Web (WWW), and proxy.
02.05 Describe the major functions and hardware requirements of network client hardware components.
02.06 Describe current link technologies such as twisted-pair, coaxial, fiber optic, and wireless.

02.07	Describe the major functions of network connectivity hardware.
02.08	Describe the function of network storage devices, storage area networks (SAN), and other peripherals.
03.0	Install and configure secure network systems software and utilities. – The student will be able to:
03.01	Install and configure current leading system software, drivers, and service packs.
03.02	Install, configure and set up a proxy server and a gateway.
03.03	Discuss the functions of authentication protocols and Virtual Private Networks (VPNs).
03.04	Install and configure web servers and related services.
03.05	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.06	Install and configure a secure desktop client operating system (OS).
03.07	Describe modifications necessary to an OS such as modifying parameters and how to handle conflicting interrupts when installing, configuring, and upgrading typical applications software.
03.08	Install and configure client software for network-based applications such as email, web browsing, terminal emulation, file transfer, group conferencing and database.
03.09	Install and configure current popular network servers for such services as: Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), email, the World Wide Web (WWW) and proxy service.
04.0	Demonstrate proficiency with Internet structure, organization, and navigation. – The student will be able to:
04.01	Describe Internet structure and administration, including such topics as Requests for Comments (RFCs) and the Domain Name System (DNS).
04.02	Describe common Internet services and port numbers.
04.03	Demonstrate the use of internetworking protocols.
04.04	Differentiate between push and pull technologies.
04.05	Demonstrate the use of typical remote access mechanisms.
04.06	Describe the data format and proprietary nature of commonly used Internet file types.
04.07	Demonstrate use of Internet clients and services.
05.0	Demonstrate an understanding of network access control systems and methodology. – The student will be able to:
05.01	Specify by access control mechanisms what users can do, which resources they can access, and what operations they can perform on a system.
05.02	Compare and contrast access control techniques.

05.03	Administer computer, group, and user accounts.
05.04	Manage policies, rights, permissions, and passwords for users and/or groups of users.
05.05	Demonstrate an understanding of various access control models.
05.06	Manage password, PIN selection, maintenance, and control.
05.07	Demonstrate an understanding of methods of identification and authentication.
05.08	Implement centralized/remote authentication access controls.
05.09	Implement and manage decentralized access controls such as domain and trust relationships.
05.10	Analyze methods of server attacks.
05.11	Demonstrate an understanding of the different types of intrusions and the different methods of intrusion detection.
05.12	Monitor the network using various forms of intrusion detection resources to detect attacks.
05.13	Investigate audit trails for signs of network intrusions.
05.14	Perform penetration testing to find weaknesses in the access control systems.
06.0	Describe cryptography concepts, standards, and applications. – The student will be able to:
06.01	Demonstrate an understanding of the encryption/decryption process.
06.02	Demonstrate an understanding of the basic functions involved in key management.
06.03	Utilize various forms of cryptography, digital certificates, and digital signatures to achieve confidentiality, integrity, authentication, and non-repudiation in an enterprise data communications network.
06.04	Discuss the creation and use of digital certificates and digital signatures to provide authentication of users and verification of data integrity in network communications.
06.05	Identify the strengths and weaknesses of cryptographic algorithms and the effects of key length.
06.06	Employ cryptographic algorithms.
06.07	Implement current popular key distribution methods.
06.08	Utilize application and network-based protocols.
06.09	Describe the use of security hardware components.
07.0	Perform telecommunications and network security activities. – The student will be able to:
07.01	Utilize protocol layering models.
07.02	Evaluate the security implications involved with the various physical media types.

07.03	Describe security concerns with using various network topologies.
07.04	Configure authentication protocol service that provide dial-in authentication and security.
07.05	Employ network monitors and packet sniffers to identify security threats.
07.06	Implement security measures using network hardware and software.
07.07	Discuss the security vulnerabilities of the TCP/IP protocol stack.
07.08	Configure Network Layer security protocols.
07.09	Configure Transport Layer security protocols.
07.10	Utilize Application Layer security protocols.
07.11	Perform connection verification using current authentication protocols.
07.12	Demonstrate an understanding of how wide area network serial line protocols work.
07.13	Implement secure data communication techniques.
07.14	Develop secure email, facsimile, and voice communication procedures to protect against network attacks.
07.15	Employ alarms and signals to alert network security administrators of intrusions.
08.0	Demonstrate an understanding of Database Management Systems (DBMS). – The student will be able to:
08.01	Compare the major types of databases.
08.02	Describe relational database concepts.
08.03	Analyze the various components of a DBMS.
08.04	Install and configure database server software from leading vendors.
08.05	Perform database administration tasks using the Structured Query Language (SQL).
08.06	Demonstrate an understanding of transaction processing and concurrency control.
08.07	Perform database backup and recovery operations.
08.08	Employ techniques to ensure database integrity and security.
09.0	Perform administrative tasks related to database security. – The student will be able to:
09.01	Develop database security guidelines.
09.02	Monitor database security systems.

09.03	Manage web database security.
09.04	Verify security compliance.
09.05	Secure backup processes.
09.06	Verify backup processes.
10.0	Demonstrate an understanding of e-commerce. – The student will be able to:
10.01	Describe e-commerce and its impact on business and society.
10.02	Differentiate between the various e-commerce business models.
10.03	Describe the development of an e-commerce business plan.
10.04	Discuss e-commerce revenue streams and e-commerce market sectors.
10.05	Develop e-commerce marketing plan.
10.06	Discuss the steps necessary to maintain transaction integrity.
10.07	Identify components and procedures necessary to process credit card transactions.
10.08	Describe applicability of and compliance with Payment Card Industry Data Security Standards (PCI-DSS).
11.0	Perform tasks related to e-commerce security. – The student will be able to:
11.01	Manage digital certificates.
11.02	Maintain integrity in transaction storage and reporting systems.
11.03	Protect credit card, personal, banking, and bill to/ship to information in transaction processes.
11.04	Oversee inventory control.
11.05	Maintain email security related to e-commerce.
11.06	Review third-party transaction processing.
11.07	Assist in evaluating e-commerce platform vulnerabilities.
12.0	Perform webserver and site management activities. – The student will be able to:
12.01	Describe the process of obtaining an Internet domain name and mapping it to an Internet Protocol (IP) address.
12.02	Compare features of currently available web site management tools.

12.03	Configure current web server software.
12.04	Use current web server software to maintain secure web sites.
12.05	Use web site access tracking and analysis tools to evaluate the security of a web server.
13.0	Design and implement physical security measures. – The student will be able to:
13.01	Identify physical threats to an enterprise's resources.
13.02	Diagnose an enterprise's physical vulnerabilities.
13.03	Specify possible countermeasures to physically protect an enterprise's resources and sensitive information.
13.04	Develop a list of physical facility requirements to secure the premises.
13.05	Evaluate the applicability of technical controls.
14.0	Perform operation and security management practices. – The student will be able to:
14.01	Perform personnel administrative security operations.
14.02	Implement client and network system security software on an enterprise-wide basis.
14.03	Ensure backups of critical information.
14.04	Protect the privacy of personal data.
14.05	Demonstrate proper handling of sensitive information and media.
14.06	Demonstrate an understanding of different control types.
14.07	Determine what enterprise resources require protection.
14.08	Compare the advantages and disadvantages of internal versus external audits.
14.09	Perform compliance checks on user adherence to security policies.
14.10	Identify different types of enterprise-wide monitoring tools and techniques.
14.11	Utilize enterprise-wide monitoring tools and techniques.
14.12	Implement countermeasures to defend against threats.
14.13	Perform penetration testing activities.
14.14	Understand principles of risk management and asset valuation.

14.15	Monitor enterprise-wide information for potential liabilities.
14.16	Manage software licenses and enforce compliance within the organization.
15.0	Employ applications and systems development security techniques. – The student will be able to:
15.01	Describe the stages of the system development life cycle.
15.02	Understand security implications of structured programming techniques.
15.03	Analyze the controls that are included within systems and applications software and those used in the development of agents, applets, software, databases, data warehouses and knowledge-based systems.
15.04	Implement features to ensure data and application integrity, security and availability.
15.05	Analyze distributed environment application issues.
15.06	Analyze local environment application issues.
15.07	Analyze key database and data warehousing issues.
15.08	Develop multilevel security schemes for databases and data warehouses.
15.09	Compare different forms of data/information storage.
15.10	Describe different aspects of application and database security control architectures.
15.11	Understand the difference between elevated privileges and user modes of operation.
15.12	Identify various levels of application integrity.
15.13	Describe the impact that malicious code plays in software development.
15.14	Formulate countermeasures to defend against or detect malicious code.
15.15	Establish a secure development environment.
16.0	Develop business continuity and disaster recovery plans. – The student will be able to:
16.01	Perform a business impact assessment.
16.02	Specify the necessary capabilities of alternative business sites.
16.03	Develop business continuity, disaster containment, and recovery plans.
16.04	Understand the impact of scheduled facility maintenance on enterprise systems.
16.05	Develop a testing program for business continuity/disaster recovery plans.
16.06	Develop a training program for personnel regarding business continuity/disaster recovery plans.

17.0	Describe ethical issues, pertinent laws, and how to conduct investigations. – The student will be able to:
17.01	Understand the major categories and types of laws as they relate to information security.
17.02	Understand institutional policies and practices regarding data privacy and intellectual property rights.
17.03	Describe abnormal and suspicious activity as it relates to information security.
17.04	Analyze potential data security threats.
17.05	Understand legal institutional policies and practices to protect against purposeful violations of data integrity.
17.06	Identify the major categories of computer crimes and attacks.
17.07	Understand institutional policies and practices to conduct an investigation of security violations.
17.08	Discuss major ethical and legal issues related to Internet and system use.
18.0	Perform general organizational computing workplace competencies. – The student will be able to:
18.01	Deliver and follow oral and written technical instructions.
18.02	Prepare and deliver a technical presentation.
18.03	Participate in group discussions as a member and as a leader.
18.04	Understand the importance of self-motivation and responsibility in completing assigned tasks.
18.05	List the steps in problem solving.
18.06	Identify and discuss issues contained within professional codes of conduct.
18.07	Discuss ethical aspects of intellectual property rights and licensing issues.
18.08	Identify potential sources of employee/employer or employee/employer conflict and discuss possible approaches to resolve such disagreements.
18.09	Use appropriate courtesy, manners, and dress in the workplace.
18.10	Apply principles and techniques for being a productive, contributing member of a team.
18.11	Identify and use acceptable strategies for resolving conflict in the workplace.
18.12	Apply principles and techniques for working productively with people of diverse cultures and backgrounds.
18.13	Identify techniques for stress management and prevention of job burnout.
18.14	Use appropriate communication skills, telephone etiquette, courtesy, and manners when dealing with individuals of a technical background.

19.0 Perform project planning and management activities. – The student will be able to:
19.01 Apply effective time management skills.
19.02 Describe appropriate measures for planning and managing a large project.
19.03 Define an implementation schedule for a large project.
19.04 Describe appropriate measures for planning and implementing corporate-wide upgrade of hardware and software.
19.05 Identify examples of effective end-user training strategies and techniques.
20.0 Perform documentation and technical reference activities. – The student will be able to:
20.01 Use technical vocabulary appropriately.
20.02 Locate information in printed and online technical references.
20.03 Prepare documentation to track assets, security-related activities, and incidents.
21.0 Demonstrate employability skills. – The student will be able to:
21.01 Identify sources of employment opportunities.
21.02 Discuss employer expectations regarding attendance, punctuality, initiative and teamwork.
21.03 Discuss employee rights regarding privacy, discrimination, due process and safety.
21.04 Explain the importance of a written job description.
21.05 Identify methods for securing employment references.
21.06 Compose a cover letter and a resume.
21.07 Complete an electronic employment application.
21.08 Classify behaviors considered appropriate or inappropriate in a job interview situation.
21.09 Demonstrate job interview skills.
21.10 Compose a follow-up letter.
21.11 Compose a letter of resignation.
22.0 Demonstrate professional development skills. – The student will be able to:
22.01 Discover corporate strategies and policies.
22.02 Understand the importance of participating in professional organizations and maintaining professional contacts.

22.03 Develop mentor relationships.
22.04 Anticipate future industry trends.
22.05 Describe options for continuing education.
22.06 Read industry journals and magazines.
22.07 Understand the importance of attending seminars, workshops, and tradeshows.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Database & E-commerce Security CCC (0511100311) – 18 credit hours.

Standards for the above certificate programs are contained in separate curriculum frameworks.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Technology Project Management**
Career Cluster: **Information Technology**

NOTE: This program has been daggered for deletion with 2016-2017 being the last cohort of students permitted to enroll in the program. After 2016-2017, no new students may be enrolled in this program. Students already enrolled in the program may, at the college's discretion, continue taking courses in the program until completion. Technology Project Management 60 1511100509 will replace this program.

AS	
CIP Number	1511100507
Program Type	College Credit
Standard Length	63 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as project managers and professionals incorporating IT project management strategies in their business activities in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to balance of business and technology components and allows the student to gain additional skills in the area of Project Management.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 63 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Proficiency in the use of computers and their peripherals.
02.0 Proficiency in the use of web browsers and access to Internet resources.
03.0 Proficiency in the use of computer software.
04.0 Proficiency in computer operating systems software.
05.0 Information technology activities.
06.0 Accounting activities.
07.0 Legal and ethical issues relative to the information technology environment.
08.0 Project management activities.
09.0 Project management software applications for project management.
10.0 Demonstrate proficiency with data modeling software.
11.0 Systems analysis and design.
12.0 Human resources management activities.
13.0 Use various models and strategies for project management.
14.0 Customer service.
15.0 Employability skills.
16.0 Communications skills.

Florida Department of Education
Student Performance Standards

Program Title: **Technology Project Management**
CIP Number: **1511100507**
Program Length: **63 credit hours**
SOC Code(s): **15-1199**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:
01.0 Proficiency in the use of computers and their peripherals. – The student will be able to:
01.01 Identify and explain the main purpose of various computer hardware devices.
01.02 Demonstrate the proper use and maintenance of printers.
01.03 Demonstrate the proper use and maintenance of PC hardware.
01.04 Demonstrate the proper use and maintenance of laptops.
01.05 Demonstrate the proper use and maintenance of networks.
01.06 Demonstrate the proper use and maintenance of digital cameras.
01.07 Demonstrate the proper use and maintenance of backup systems.
02.0 Proficiency in the use of web browsers and access to Internet resources. – The student will be able to:
02.01 Explain the history, purpose and use of the World Wide Web.
02.02 Describe proper Internet etiquette and usage.
02.03 Explain how to connect to the Internet.
02.04 Explain the purpose and use of browsers and search engines.
02.05 Use a web browser to navigate the Web.
02.06 Send electronic communications.
02.07 Explain issues specific to electronic communications.
02.08 Set up an email account.

02.09	Participate in discussion groups and social media.
02.10	Explain the guidelines for evaluating information needs before beginning a search.
02.11	Explain issues associated with pornography, free speech, censorship, filtering, and copyright on the Web.
02.12	Describe how to critically evaluate online information content.
02.13	Use and manage browser tools.
02.14	Capture images, text, sound, and data from web pages.
02.15	Work with file transfer tools and related protocols.
02.16	Design and publish a simple web page.
03.0	Proficiency in the use of computer software. – The student will be able to:
03.01	Identify and use personal productivity software.
03.02	Identify and use project management software.
03.03	Identify and use web page design software.
03.04	Identify and use system security software.
04.0	Proficiency in computer operating systems software. – The student will be able to:
04.01	Describe the historical development of computer operating systems.
04.02	Describe the major hardware and related software of computers.
04.03	Describe the various operating systems.
04.04	Explain system and application architectures.
04.05	Describe various disk formats.
04.06	Describe the file system functions.
04.07	Demonstrate knowledge of system processes.
05.0	Information technology activities. – The student will be able to:
05.01	Describe the impact of information technology on business operations.
05.02	Describe the use of computing and software for business.

	05.03 Describe the use of communication and research for business.
	05.04 Describe the use of web publishing for business.
	05.05 Describe the use of digital media for business.
06.0	Accounting activities. – The student will be able to:
	06.01 Demonstrate an understanding of the basic accounting principles and practices.
	06.02 Demonstrate an understanding of budgeting.
	06.03 Demonstrate an understanding of costing.
	06.04 Identify fundamental financial analysis concepts.
	06.05 Describe financial analysis tools.
	06.06 Understand and interpret financial reports.
07.0	Legal and ethical issues relative to the information technology environment. – The student will be able to:
	07.01 Discuss the types of works that are protected by intellectual property laws.
	07.02 Discuss the basic elements of a contract.
	07.03 Discuss email litigation, including anti-spam laws.
	07.04 Discuss email use and ownership.
	07.05 Describe customer and employee privacy issues and safeguards.
	07.06 Develop examples of acceptable use policies.
	07.07 Compare organizational codes of ethics.
	07.08 Research industry standards and codes of conduct for information technology professionals.
	07.09 Write a personal code of ethics.
08.0	Project management activities. – The student will be able to:
	08.01 Examine the organization, planning, and controlling of projects.
	08.02 Define project integration management.
	08.03 Describe project phases, process groups, and the full project life cycle.

08.04	Understand the basic tools and techniques to plan, organize, and manage a project.
08.05	Describe the principles of identifying, developing, and managing resources.
08.06	Plan and monitor a project budget and schedule.
08.07	Understand the technical and human aspects of project control, especially change control.
08.08	Describe the basic tools and techniques of managing project quality and risk.
08.09	Understand the contextual relationship between the project and the organization that hosts the project.
08.10	Demonstrate an understanding of the importance of working in teams, managing team members, and interacting with stakeholders.
08.11	Understand the importance of ethical considerations in every aspect of a project's operation.
08.12	Distinguish between project management processes and product-oriented processes.
08.13	Sequence the groups of processes, as they would normally occur when managing a complex project.
08.14	Identify the strengths and weaknesses of various project life cycle designs.
08.15	Understand the importance of managing project scope.
08.16	Compare and contrast project selection methods.
08.17	Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe the elements of each.
08.18	Compare and contrast types of cost estimates.
08.19	Examine cost control and earned value analysis.
08.20	Examine organizational planning, staff acquisition, and team development.
08.21	Examine risk identification, quantification, response development, and response control.
08.22	Compare and contrast project tracking and project reporting.
08.23	Understand and manage the change control process.
08.24	Identify the costs and benefits of subcontracting and outsourcing.
08.25	Apply fundamental financial analysis concepts to project management tasks.
08.26	Use formal cost and schedule control and variance analysis to detect pending problems so the problems can be corrected or workaround strategies can be implemented.
08.27	Track the expenses and costs of a project and compare them to the project plan.

	08.28 Explain how a project manager can control and manage projects and contract finances.
	08.29 Identify problem solving strategies utilizing current effective decision making methods.
09.0	Project management software applications for project management. – The student will be able to:
	09.01 Demonstrate proficiency with project management software.
	09.02 Understand the value of accounting, auditing, and customer relation software.
	09.03 Understand the benefits and challenges of working within an Enterprise Resource Planning (ERP) software.
10.0	Demonstrate proficiency with data modeling software.
	10.01 Demonstrate proficiency with remote controlling software.
	10.02 Demonstrate proficiency with program development software.
11.0	Systems analysis and design. – The student will be able to:
	11.01 Perform a preliminary investigation of a systems project.
	11.02 Perform a detailed systems investigation and analysis of the project.
	11.03 Design the input and output for the system.
	11.04 Design the data files for the system.
	11.05 Design the processing flow of the system.
	11.06 Design a system to insure that only valid data is accepted and processed, completely and accurately.
	11.07 Establish a project plan for the development, testing, and implementation of the system.
	11.08 Develop the final systems documentation.
	11.09 Conduct necessary training and file conversion to properly implement the system.
12.0	Human resources management activities. – The student will be able to:
	12.01 Describe the importance of human resources.
	12.02 Describe the components of the job requirement and analysis process.
	12.03 Describe the important elements of effective human resource planning.
	12.04 Discuss the performance appraisal and the uses of the performance appraisal.

12.05	Compare various training options available to organizations.
12.06	Describe various ways of compensating employees.
12.07	Summarize the legal regulations of compensation systems.
12.08	Explain the importance of employee retention.
12.09	Discuss the importance of safety and health laws and standards.
12.10	Describe how to create a safe and healthy work environment.
12.11	Describe labor relations and collective bargaining.
12.12	Analyze and develop written solutions to behavior problems affecting job performance.
13.0	Use various models and strategies for project management. – The student will be able to:
13.01	Understand how to control a project.
13.02	Identify the goals of project management.
13.03	Establish effective communication with stakeholders to increase project efficiency.
13.04	Create a project priority matrix to balance priorities.
13.05	Evaluate the critical path to reduce project length.
13.06	Use Planning Processes: WBS, risk management, estimating, and scheduling.
13.07	Use cost management, procurement management, and project tracking methods/models/strategies.
13.08	Describe closing processes.
14.0	Customer service. – The student will be able to:
14.01	Define customer service.
14.02	Explain the value of customer service.
14.03	Discuss solutions to overcoming obstacles in customer service.
14.04	Define service culture in organizations.
14.05	Describe management's role in customer service formulation.
14.06	Describe employee empowerment and its importance in providing good customer service.

14.07	Explain the role of communication in customer service.
14.08	Describe the basic behavioral styles of customers.
14.09	Explain the difference behavioral styles of a challenging customer.
14.10	Describe strategies of dealing with challenging customers.
14.11	Determine strategies for working with various customer behaviors.
15.0	Employability skills. – The student will be able to:
15.01	Conduct a job search.
15.02	Secure information about a job.
15.03	List and obtain documents that may be required when applying for a job and preparing for an interview.
15.04	Complete a job application form.
15.05	Demonstrate competence in job interview techniques.
15.06	Identify or demonstrate appropriate responses to criticism.
15.07	Identify and describe acceptable work habits.
15.08	Demonstrate knowledge of how to make appropriate job changes during the course of a career.
16.0	Communications skills. – The student will be able to:
16.01	Write logical and clear statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
16.02	Read and explain graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
16.03	Deliver and follow oral and written instructions.
16.04	Answer and ask questions coherently and concisely.
16.05	Read critically by recognizing assumptions and implications and by evaluating ideas.
16.06	Demonstrate appropriate communication skills.
16.07	Prepare and deliver a technical presentation.
16.08	Observe and interpret verbal and nonverbal behavior.
16.09	Compose and critique business documents, memorandums, business letters, requests, answer requests, claims/adjustments, and letters using correct English grammar and punctuation.

16.10	Demonstrate effective use of electronic communication.
16.11	Summarize the skills involved in being an effective listener.
16.12	Demonstrate ability to work and communicate effectively in multicultural and diverse environments.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

CompTIA Project+ (COMPT007) – 3 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 63 credit hours according to Rule 6A-14.030, F.A.C.

Florida Department of Education
Curriculum Framework

Program Title: **Enterprise Resource Planning (ERP) Software Specialist**
Career Cluster: **Information Technology**

AS	
CIP Number	1511100508
Program Type	College Credit
Standard Length	63 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	11-3021 – Computer and Information Systems Managers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as an ERP specialist, ERP developer, ERP interface technician, ERP administrator, ERP database specialist, ERP designer, or ERP planner in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to enterprise resource software environments such as SAP, Oracle, PeopleSoft, MAPICS, Great Plains, and others.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 63 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of Enterprise Resource Planning (ERP) and Electronic Business fundamentals.
02.0 Demonstrate proficiency in developing Electronic Resource Planning (ERP) systems solutions.
03.0 Demonstrate proficiency in Enterprise Resource Planning (ERP) technical functional requirements.
04.0 Demonstrate proficiency in Enterprise Resource Planning (ERP) project planning.
05.0 Demonstrate proficiency in Enterprise Resource Planning (ERP) project coordination.
06.0 Demonstrate proficiency in developing Enterprise Resource Planning (ERP) customer business function requirements.
07.0 Demonstrate competence in communications with Enterprise Resource Planning (ERP) customers.
08.0 Demonstrate proficiency in business and management processes.
09.0 Demonstrate proficiency with high-level computer programming languages as related to Enterprise Resource Planning (ERP) software.
10.0 Perform general organizational computing workplace competencies.
11.0 Demonstrate employability skills.
12.0 Demonstrate business communication skills.
13.0 Demonstrate professional development skills.

Florida Department of Education
Student Performance Standards

Program Title: **Enterprise Resource Planning (ERP) Software Specialist**
CIP Number: **1511100508**
Program Length: **63 credit hours**
SOC Code(s): **11-3021**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of enterprise resource planning (ERP) and electronic business fundamentals. – The student will be able to:
01.01	Identify characteristics of the American enterprise system, electronic business (e-commerce), and ERP systems.
01.02	List the types of large-scale business environments that ERP systems support.
01.03	Understand ERP terminology.
01.04	Describe how ERP uses a collection of software applications to manage the entire organization.
01.05	Describe how ERP systems integrate sales, manufacturing, logistics, accounting and other enterprise business functions.
01.06	Describe how ERP systems share common database and business analysis tools.
01.07	Describe how e-commerce has changed society.
01.08	Differentiate between the various e-commerce and ERP business models.
01.09	Identify e-commerce market sectors.
01.10	List factors that contribute to economic growth and impact supply and demand.
01.11	Identify characteristics of different types of business ownership.
02.0	Demonstrate proficiency in developing electronic resource planning (ERP) systems solutions. – The student will be able to:
02.01	Research available enterprise solutions.
02.02	Review evaluations of comparable ERP software programs and vendors.
02.03	Compare collected data.
02.04	Participate in demonstrations of ERP software programs.

02.05	Assess hardware requirements.
02.06	Assess software requirements.
02.07	Analyze solution integration activities.
02.08	Establish benchmarking and sizing criteria.
02.09	Assist in identifying overall costs.
02.10	Understand the difference and relationship between ERP and Customer Relation Management (CRM) software.
02.11	List and compare implementation costs.
02.12	List and compare training costs.
03.0	Demonstrate proficiency in enterprise resource planning (ERP) technical functional requirements. – The student will be able to
03.01	Demonstrate understanding of issues related to shared data and integrated databases.
03.02	Design relational databases.
03.03	Develop relational databases.
03.04	Utilize database toolset – GUI.
03.05	Exhibit working knowledge of query language.
03.06	Develop an application that interfaces with a database.
03.07	Create simple interfaces for data conversion between sources and systems.
03.08	Design and develop interface between ERP modules and systems.
03.09	Develop simple programs using ERP development tools.
03.10	Create usable reports with writing tools and languages related to applicable ERP systems.
03.11	Identify different operating system architectures.
03.12	Identify networking protocols' benefits and limitations.
03.13	Document technical modifications to programs and systems.
03.14	Exhibit proficiency in the concepts of distributed applications.

04.0	Demonstrate proficiency in enterprise resource planning (ERP) project planning. – The student will be able to:
04.01	Describe project planning fundamentals and concepts.
04.02	Identify project stakeholders.
04.03	Determine stakeholder needs.
04.04	Determine stakeholder training requirements.
04.05	Identify potential stakeholder conflicts of interest.
04.06	Define the scope of a project.
04.07	Create project timelines.
04.08	Establish rules of communication between project stakeholders.
04.09	Create approval plans.
04.10	Create conflict resolution plans.
04.11	Define and sequence tasks.
04.12	Identify technology-related risks.
04.13	Establish project hardware and software dependencies.
04.14	Identify and assign project resources and materials.
04.15	Budget resources.
04.16	Identify training needs.
04.17	Document project plan.
04.18	Construct an implementation schedule for a large project.
05.0	Demonstrate proficiency in enterprise resource planning (ERP) project coordination. – The student will be able to:
05.01	Use workflow software tools.
05.02	Identify and manage project resources.
05.03	Identify and manage project risks.
05.04	Collaborate with team members.

	05.05 Facilitate project changes.
	05.06 Participate in project implementation activities.
	05.07 Perform a detailed project analysis.
	05.08 Describe the scale and impact of the project on the organization.
	05.09 Identify how business process integration will change the relationships between traditional functional departments within the organization.
	05.10 Describe any role re-definement by function within the organization.
	05.11 Describe the cost and time parameters of the project an implementation schedule for a large project.
06.0	Demonstrate proficiency in developing enterprise resource planning (ERP) customers' business function requirements. – The student will be able to:
	06.01 Identify, document, and compile stakeholder requirement.
	06.02 Define the scope, objectives, and parameters of the project.
	06.03 Interview users and analyze their workflow systems and procedures.
	06.04 Identify integration points by department and process.
	06.05 Describe the function and supporting activities for Joint Application Development (JAD) meeting.
	06.06 Describe the overall impact the project will have on the organization.
	06.07 Assist in identifying potential problem areas.
	06.08 Assist with user training.
	06.09 Identify solutions and methods to fulfill requirements.
07.0	Demonstrate competence in communications with enterprise resource planning (ERP) customers. – The student will be able to:
	07.01 Summarize and document project overview.
	07.02 Create ERP design modules.
	07.03 Write program test scripts.
	07.04 Present design models.
	07.05 Coordinate activities and resources with all relevant departments.
	07.06 Schedule meetings.

07.07	Create progress reports.
07.08	Prepare boardroom presentations.
07.09	Deliver and explain procedure to stakeholders.
07.10	Act as a training intermediary for stakeholders.
07.11	Identify and define long-term implications of system changes.
07.12	Explain the difference between outsourcing and in-house support.
07.13	Apply effective customer relations.
07.14	Describe techniques for keeping the customer informed.
07.15	Demonstrate proper follow-up techniques.
08.0	Demonstrate proficiency in business and management processes. – The student will be able to:
08.01	Identify forms of business and not-for-profit organizations.
08.02	Describe basic functions within the typical business organization.
08.03	Describe various forms of management hierarchies and organizational design.
08.04	Identify the responsibilities and duties of managers by level or function within the organization.
08.05	Contrast the operations and organizational form of small organizations and large enterprises.
08.06	Describe the role of Information Technology in modern business management.
08.07	Explain the interrelationships between business processes including marketing, production, finance, human resources.
08.08	Identify software packages that support the business processes used by large enterprises.
08.09	Describe the general accounting process.
08.10	Interpret and use financial reports, budgets, and basic financial analysis techniques.
08.11	Use productivity software to create spreadsheets, documents, reports, schedules, databases, and Internet communication.
08.12	Describe the role of labor in modern business management.
08.13	Describe the functions of human resource management.
08.14	List the basic components of business contracts.

09.0	Demonstrate proficiency with high-level computer programming languages as related to Enterprise Resource Planning (ERP) software. – The student will be able to:
	09.01 Describe the programming languages applicable to ERP software.
	09.02 Apply structured programming for a high-level program as related to ERP software.
	09.03 Write a program in a high-level language as related to ERP software.
	09.04 Identify and define associated system level concepts.
	09.05 Describe mid-range and mainframe computer environments that support ERP.
10.0	Perform general organizational computing workplace competencies. – The student will be able to:
	10.01 Follow oral and written instructions.
	10.02 Prepare, outline, and deliver a short oral presentation.
	10.03 Prepare visual material to support an oral presentation.
	10.04 Interpret appropriate information from graphics, maps, or signs.
	10.05 Participate in group discussions as a member and as a leader.
	10.06 Apply effective time-management skills.
	10.07 Demonstrate self-motivation and responsibility to complete an assigned task.
	10.08 Identify issues contained within professional codes of conduct.
	10.09 Identify software licensing issues.
	10.10 Identify privacy issues.
	10.11 Identify encryption issues.
	10.12 Identify legal liability issues.
	10.13 Describe acceptable use policies for computer environment.
	10.14 Identify copyright issues.
	10.15 Apply principles and techniques for being a productive, contributing member of a team.
	10.16 Identify and use acceptable strategies for resolving conflict in the workplace.
	10.17 Identify techniques for stress management and prevention of job burnout.

11.0	Demonstrate employability skills. – The student will be able to:
11.01	Describe different job search methods, including online and traditional.
11.02	Conduct a job search.
11.03	Identify documents, which may be required when applying for a job interview.
11.04	Complete a job application form correctly.
11.05	Demonstrate competence in job interview techniques.
11.06	Identify acceptable work habits.
11.07	Demonstrate knowledge of the "Florida Right-To-Know Law" as recorded in Florida Statutes Chapter 442.
12.0	Demonstrate business communication skills. – The student will be able to:
12.01	Accurately fill out forms and create documents commonly used in business and industry.
12.02	Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
12.03	Read and follow written and oral instructions.
12.04	Answer and ask questions coherently and concisely.
12.05	Use correct grammar in written and oral communication.
12.06	Demonstrate appropriate telephone communication skills.
12.07	Demonstrate appropriate verbal skills.
12.08	Demonstrate appropriate listening skills.
12.09	Demonstrate appropriate business etiquette skills.
12.10	Use and follow ethical standards as related to ERP.
13.0	Demonstrate professional development skills. – The student will be able to:
13.01	Identify corporate strategies and policies.
13.02	Build mentor relationships.
13.03	Identify industry trends and developments.
13.04	Continue formal education.

13.05	Network with industry professionals.
13.06	Read industry journals and magazines.
13.07	Attend seminars, workshops, and tradeshows.
13.08	Obtain industry and field certifications as required for career advancement.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Technology Project Management (60)**
Career Cluster: **Information Technology**

AS	
CIP Number	1511100509
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as project managers and professionals incorporating IT project management strategies in their business activities in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to balance of business and technology components and allows the student to gain additional skills in the area of Project Management.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Proficiency in the use of computers and their peripherals.
02.0 Proficiency in the use of web browsers and access to Internet resources.
03.0 Proficiency in the use of computer software.
04.0 Proficiency in computer operating systems software.
05.0 Information technology activities.
06.0 Accounting activities.
07.0 Legal and ethical issues relative to the information technology environment.
08.0 Project management activities.
09.0 Project management software applications for project management.
10.0 Demonstrate proficiency with data modeling software.
11.0 Systems analysis and design.
12.0 Human resources management activities.
13.0 Use various models and strategies for project management.
14.0 Customer service.
15.0 Employability skills.
16.0 Communications skills.

Florida Department of Education
Student Performance Standards

Program Title: **Technology Project Management (60)**
CIP Number: **1511100509**
Program Length: **60 credit hours**
SOC Code(s): **15-1199**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:
01.0 Proficiency in the use of computers and their peripherals. – The student will be able to:
01.01 Identify and explain the main purpose of various computer hardware devices.
01.02 Demonstrate the proper use and maintenance of printers.
01.03 Demonstrate the proper use and maintenance of PC hardware.
01.04 Demonstrate the proper use and maintenance of laptops.
01.05 Demonstrate the proper use and maintenance of networks.
01.06 Demonstrate the proper use and maintenance of digital cameras.
01.07 Demonstrate the proper use and maintenance of backup systems.
02.0 Proficiency in the use of web browsers and access to Internet resources. – The student will be able to:
02.01 Explain the history, purpose and use of the World Wide Web.
02.02 Describe proper Internet etiquette and usage.
02.03 Explain how to connect to the Internet.
02.04 Explain the purpose and use of browsers and search engines.
02.05 Use a web browser to navigate the Web.
02.06 Send electronic communications.
02.07 Explain issues specific to electronic communications.
02.08 Set up an email account.

02.09	Participate in discussion groups and social media.
02.10	Explain the guidelines for evaluating information needs before beginning a search.
02.11	Explain issues associated with pornography, free speech, censorship, filtering, and copyright on the Web.
02.12	Describe how to critically evaluate online information content.
02.13	Use and manage browser tools.
02.14	Capture images, text, sound, and data from web pages.
02.15	Work with file transfer tools and related protocols.
02.16	Design and publish a simple web page.
03.0	Proficiency in the use of computer software. – The student will be able to:
03.01	Identify and use personal productivity software.
03.02	Identify and use project management software.
03.03	Identify and use web page design software.
03.04	Identify and use system security software.
04.0	Proficiency in computer operating systems software. – The student will be able to:
04.01	Describe the historical development of computer operating systems.
04.02	Describe the major hardware and related software of computers.
04.03	Describe the various operating systems.
04.04	Explain system and application architectures.
04.05	Describe various disk formats.
04.06	Describe the file system functions.
04.07	Demonstrate knowledge of system processes.
05.0	Information technology activities. – The student will be able to:
05.01	Describe the impact of information technology on business operations.
05.02	Describe the use of computing and software for business.

	05.03 Describe the use of communication and research for business.
	05.04 Describe the use of web publishing for business.
	05.05 Describe the use of digital media for business.
06.0	Accounting activities. – The student will be able to:
	06.01 Demonstrate an understanding of the basic accounting principles and practices.
	06.02 Demonstrate an understanding of budgeting.
	06.03 Demonstrate an understanding of costing.
	06.04 Identify fundamental financial analysis concepts.
	06.05 Describe financial analysis tools.
	06.06 Understand and interpret financial reports.
07.0	Legal and ethical issues relative to the information technology environment. – The student will be able to:
	07.01 Discuss the types of works that are protected by intellectual property laws.
	07.02 Discuss the basic elements of a contract.
	07.03 Discuss email litigation, including anti-spam laws.
	07.04 Discuss email use and ownership.
	07.05 Describe customer and employee privacy issues and safeguards.
	07.06 Develop examples of acceptable use policies.
	07.07 Compare organizational codes of ethics.
	07.08 Research industry standards and codes of conduct for information technology professionals.
	07.09 Write a personal code of ethics.
08.0	Project management activities. – The student will be able to:
	08.01 Examine the organization, planning, and controlling of projects
	08.02 Define project integration management
	08.03 Describe project phases, process groups, and the full project life cycle.

08.04	Understand the basic tools and techniques to plan, organize, and manage a project.
08.05	Describe the principles of identifying, developing, and managing resources.
08.06	Plan and monitor a project budget and schedule.
08.07	Understand the technical and human aspects of project control, especially change control.
08.08	Describe the basic tools and techniques of managing project quality and risk.
08.09	Understand the contextual relationship between the project and the organization that hosts the project.
08.10	Demonstrate an understanding of the importance of working in teams, managing team members, and interacting with stakeholders.
08.11	Understand the importance of ethical considerations in every aspect of a project's operation.
08.12	Distinguish between project management processes and product-oriented processes.
08.13	Sequence the groups of processes, as they would normally occur when managing a complex project.
08.14	Identify the strengths and weaknesses of various project life cycle designs.
08.15	Understand the importance of managing project scope.
08.16	Compare and contrast project selection methods.
08.17	Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe the elements of each.
08.18	Compare and contrast types of cost estimates.
08.19	Examine cost control and earned value analysis.
08.20	Examine organizational planning, staff acquisition, and team development.
08.21	Examine risk identification, quantification, response development, and response control.
08.22	Compare and contrast project tracking and project reporting.
08.23	Understand and manage the change control process.
08.24	Identify the costs and benefits of subcontracting and outsourcing.
08.25	Apply fundamental financial analysis concepts to project management tasks.
08.26	Use formal cost and schedule control and variance analysis to detect pending problems so the problems can be corrected or workaround strategies can be implemented.
08.27	Track the expenses and costs of a project and compare them to the project plan.

	08.28 Explain how a project manager can control and manage projects and contract finances.
	08.29 Identify problem solving strategies utilizing current effective decision making methods.
09.0	Project management software applications for project management. – The student will be able to:
	09.01 Demonstrate proficiency with project management software.
	09.02 Understand the value of accounting, auditing, and customer relation software.
	09.03 Understand the benefits and challenges of working within an Enterprise Resource Planning (ERP) software.
10.0	Demonstrate proficiency with data modeling software.
	10.01 Demonstrate proficiency with remote controlling software.
	10.02 Demonstrate proficiency with program development software.
11.0	Systems analysis and design. – The student will be able to:
	11.01 Perform a preliminary investigation of a systems project.
	11.02 Perform a detailed systems investigation and analysis of the project.
	11.03 Design the input and output for the system.
	11.04 Design the data files for the system.
	11.05 Design the processing flow of the system.
	11.06 Design a system to insure that only valid data is accepted and processed, completely and accurately.
	11.07 Establish a project plan for the development, testing, and implementation of the system.
	11.08 Develop the final systems documentation.
	11.09 Conduct necessary training and file conversion to properly implement the system.
12.0	Human resources management activities. – The student will be able to:
	12.01 Describe the importance of human resources.
	12.02 Describe the components of the job requirement and analysis process.
	12.03 Describe the important elements of effective human resource planning.
	12.04 Discuss the performance appraisal and the uses of the performance appraisal.

12.05	Compare various training options available to organizations.
12.06	Describe various ways of compensating employees.
12.07	Summarize the legal regulations of compensation systems.
12.08	Explain the importance of employee retention.
12.09	Discuss the importance of safety and health laws and standards.
12.10	Describe how to create a safe and healthy work environment.
12.11	Describe labor relations and collective bargaining.
12.12	Analyze and develop written solutions to behavior problems affecting job performance.
13.0	Use various models and strategies for project management. – The student will be able to:
13.01	Understand how to control a project.
13.02	Identify the goals of project management.
13.03	Establish effective communication with stakeholders to increase project efficiency.
13.04	Create a project priority matrix to balance priorities.
13.05	Evaluate the critical path to reduce project length.
13.06	Use Planning Processes: WBS, risk management, estimating, and scheduling.
13.07	Use cost management, procurement management, and project tracking methods/models/strategies.
13.08	Describe closing processes.
14.0	Customer service. – The student will be able to:
14.01	Define customer service.
14.02	Explain the value of customer service.
14.03	Discuss solutions to overcoming obstacles in customer service.
14.04	Define service culture in organizations.
14.05	Describe management's role in customer service formulation.
14.06	Describe employee empowerment and its importance in providing good customer service.

14.07	Explain the role of communication in customer service.
14.08	Describe the basic behavioral styles of customers.
14.09	Explain the difference behavioral styles of a challenging customer.
14.10	Describe strategies of dealing with challenging customers.
14.11	Determine strategies for working with various customer behaviors.
15.0	Employability skills. – The student will be able to:
15.01	Conduct a job search.
15.02	Secure information about a job.
15.03	List and obtain documents that may be required when applying for a job and preparing for an interview.
15.04	Complete a job application form.
15.05	Demonstrate competence in job interview techniques.
15.06	Identify or demonstrate appropriate responses to criticism.
15.07	Identify and describe acceptable work habits.
15.08	Demonstrate knowledge of how to make appropriate job changes during the course of a career.
16.0	Communications skills. – The student will be able to:
16.01	Write logical and clear statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
16.02	Read and explain graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
16.03	Deliver and follow oral and written instructions.
16.04	Answer and ask questions coherently and concisely.
16.05	Read critically by recognizing assumptions and implications and by evaluating ideas.
16.06	Demonstrate appropriate communication skills.
16.07	Prepare and deliver a technical presentation.
16.08	Observe and interpret verbal and nonverbal behavior.
16.09	Compose and critique business documents, memorandums, business letters, requests, answer requests, claims/adjustments, and letters using correct English grammar and punctuation.

16.10	Demonstrate effective use of electronic communication.
16.11	Summarize the skills involved in being an effective listener.
16.12	Demonstrate ability to work and communicate effectively in multicultural and diverse environments.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

CompTIA Project+ (COMPT007) – 3 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 60 credit hours according to Rule 6A-14.030, F.A.C.

Florida Department of Education
Curriculum Framework

Program Title: **E-Business Technology**
Career Cluster: **Information Technology**

AS	
CIP Number	1552120100
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Others
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in E-Business such as computer specialists, database technicians, security specialists, Web content specialists, developers, technical, systems, and network analysts, Web security specialists, and Internet technical support specialists in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

This program focuses on a balance of business and technology components and allows the student to gain additional skills in one of four areas of specialization: Business, Technology, Software, and Security.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate comprehension and communication skills.
02.0 Demonstrate professional development skills.
03.0 Perform documentation and technical reference activities.
04.0 Demonstrate employment skills.
05.0 Perform general organizational workplace competencies.
06.0 Demonstrate knowledge of legal and ethical issues.
07.0 Perform project management activities.
08.0 Understand issues related to e-Business.
09.0 Understand local area networks.
10.0 Demonstrate proficiency in microcomputer operating systems and software.
11.0 Perform Web authoring activities.
12.0 Conduct systems analysis and design.
13.0 Understand database management systems.
14.0 Compare and contrast e-Business with traditional business.
15.0 Identify, classify and demonstrate management activities for e-Business.
16.0 Identify legal and ethical issues for e-Business.
17.0 Accounting and finance activities.
18.0 Perform marketing activities for e-Business.

In addition to the above core outcomes, the student will successfully complete the outcomes in at least one of the following specializations:

Security Specialization

19.0 Design, develop and implement physical, network, host, application, and user security systems for e-Business.
20.0 Maintain and monitor security policies.

Software Specialization

19.0 Use various programming software applications, languages and protocols for e-Business environment.
20.0 Develop software applications for e-Business environment.

Technology Specialization

19.0 Perform Web Server Management activities.
20.0 Support e-Business applications and product development.
21.0 Maintain network infrastructure.

22.0 Design, integrate and deploy e-Business systems.
23.0 Perform technical requirements to support UNIX operating system.
24.0 Maintain systems quality and perform testing activities.

Business Specialization

19.0 Perform management activities to support human resources in e-Business environment.
20.0 Perform activities to enhance supply chain management in e-Business.
21.0 Use various models and strategies for e-Business.
22.0 Perform customer service techniques for e-Business.
23.0 Perform selling techniques for e-Business.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Technology**
CIP Number: **1552120100**
Program Length: **60 credit hours**
SOC Code(s): **15-1199**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate comprehension and communication skills. – The student will be able to:
01.01	Read and discuss work from different professional journals related to the course content.
01.02	Use reference sources such as books, magazines, and electronic databases to gather and critically evaluate materials.
01.03	Prepare, outline and deliver an oral report with appropriate materials.
01.04	Participate in group discussions as a member and as a leader.
01.05	Follow written and oral technical instructions.
01.06	Read and understand graphs, charts, diagrams and tables commonly used in this industry/occupation.
02.0	Demonstrate professional development skills. – The student will be able to:
02.01	Identify corporate strategies and policies.
02.02	Maintain professional contact for future projects.
02.03	Facilitate mentor relationships.
02.04	Network with local professionals in the industry.
02.05	Understand the importance of attending seminars, workshops, and tradeshows.
03.0	Perform documentation and technical reference activities. – The student will be able to:
03.01	Use technical vocabulary appropriately.
03.02	Locate information in technical references.
03.03	Prepare technical reports.

	03.04 Describe appropriate documentation procedures and practices.
	03.05 Produce and maintain system documentation.
	03.06 Perform documentation and technical reference activities.
	03.07 Cite correctly Internet-based resources using proper format.
	03.08 Research industry trends on the Internet.
04.0	Demonstrate employment skills. – The student will be able to:
	04.01 Identify appropriate attire and grooming for a business office.
	04.02 Conduct a job search.
	04.03 Demonstrate job interview skills.
	04.04 Identify methods for securing an employment references.
	04.05 Identify and discuss issues contained within professional codes of conduct.
	04.06 Use appropriate communication skills, courtesy, manners, and dress in the workplace.
	04.07 Identify acceptable work habits.
	04.08 Identify and use acceptable strategies for resolving conflict in the workplace.
	04.09 Identify and demonstrate appropriate responses to criticism from employers, supervisor, or other employees.
	04.10 Apply principles and techniques for working productively with people of diverse cultures and backgrounds.
	04.11 Identify techniques for stress management and prevention of job burn-out.
	04.12 Use appropriate communication skills, telephone etiquette, courtesy, and manners when dealing with customers.
	04.13 Demonstrate knowledge of how to make appropriate job changes.
05.0	Perform general organizational workplace competencies. – The student will be able to:
	05.01 Follow oral and written instructions.
	05.02 Prepare, outline, and deliver a short oral presentation.
	05.03 Participate in group discussion as a member and as a leader.

05.04	Prepare visual material to support an oral presentation.
05.05	List the steps in problem solving.
05.06	Choose appropriate action in situations requiring effective time management.
05.07	Apply principles and techniques for being a productive, contributing member of a team.
05.08	Communicate effectively with individuals lacking a technical background.
05.09	Identify clear detailed technical oral instructions.
05.10	Identify examples of effective strategies to fulfill end user needs training strategies and techniques.
05.11	Identify strategies to build mutual trust, respect, and cooperation among team members.
05.12	Apply techniques for organizing and planning of time and resources to complete an assigned task.
05.13	Apply active listening techniques in interpersonal communications.
05.14	Identify strategies to improve and maximize productivity in the workplace.
05.15	Brainstorm techniques such as brainstorming to generate ideas and suggestions to achieve a task.
05.16	Analyze alternatives and compare costs and benefits in determining the best solution.
06.0	Demonstrate knowledge of legal and ethical issues. – The student will be able to:
06.01	Correctly cite or attribute sources.
06.02	Use copyrighted materials appropriately.
06.03	Identify the types of works that are protected by intellectual property laws.
06.04	Discuss the basic elements of a contract.
06.05	Explain laws regarding e-mail litigation, including anti-spam laws.
06.06	Discuss e-mail use and ownership.
06.07	Describe customer and employee privacy issues and safeguards.
06.08	Develop examples of acceptable use policies.
06.09	Compare organizational codes of ethics.
06.10	Research and write a personal code of ethics.

07.0	Perform project management activities. – The student will be able to:
	07.01 Describe the role of project management (PM) within the organization.
	07.02 Identify the strengths and weaknesses of various project life cycle designs.
	07.03 Demonstrate the importance of project scope management.
	07.04 Compare and contrast project selection methods.
	07.05 Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe those different elements.
	07.06 Compare and contrast types of cost estimates.
	07.07 Examine cost control and earned value analysis.
	07.08 Examine organizational planning, staff acquisition, and team development.
	07.09 Examine risk identification, quantification, response development, and response control.
	07.10 Compare and contrast project tracking and project reporting.
	07.11 Understand change control and configuration control.
	07.12 Understand subcontracting and outsourcing.
	07.13 Discuss and analyze project management case studies.
08.0	Understand issues related to e-Business. – The student will be able to:
	08.01 Explain the difference between intranet and the Internet and the role of each in e-Business.
	08.02 Explain the history, purpose and use of the World Wide Web and how it has enabled e-Business.
	08.03 Describe the rise of various e-Business models.
	08.04 Explain security issues related to electronic payment.
	08.05 Explain issues of advertising, marketing and solicitation activities affecting e-Business.
09.0	Understand local area networks. – The student will be able to:
	09.01 Identify and explain the main purpose of various communication hardware devices, communication media, and protocols.
	09.02 Describe various network topologies.

	09.03 Differentiate between the OSI reference model and the TCP/IP protocol architecture.
	09.04 Differentiate between analog and digital signals.
	09.05 Describe various transmission media and how devices such as modems work.
	09.06 Explain collision occurrences and detection.
	09.07 Explain the factors and techniques for data transportation.
10.0	Demonstrate proficiency in microcomputer operating systems and software. – The student will be able to:
	10.01 Describe the historical development of computer operating software.
	10.02 Describe the major hardware and related software of microcomputers.
	10.03 Describe the various operating systems.
	10.04 Explain system and application architectures.
	10.05 Describe various media and file formats.
	10.06 Use various software applications, including word processors, spreadsheets, databases, presentation software, and appointment scheduling applications.
	10.07 Identify the major programming languages used in business data processing.
11.0	Perform web authoring activities to support e-Business. – The student will be able to:
	11.01 Identify and describe the components of an HTML document.
	11.02 Create lists in an HTML document.
	11.03 Recognize the various layouts used in web site design.
	11.04 Use storyboarding to design a comprehensive web site.
	11.05 Create links between HTML documents within a web site and to external HTML documents.
	11.06 Create tables.
	11.07 Add images to Web pages.
	11.08 Use CSS to customize web page styles.
	11.09 Create image maps.

	11.10 Identify elements of HTML fill-in forms.
	11.11 Describe the various CGI scripting languages used in a Web site.
	11.12 Identify and use client side programming technologies.
12.0	Conduct systems analysis and design. – The student will be able to:
	12.01 Perform a detailed systems investigation and analysis of the project.
	12.02 Design the input and output for the system.
	12.03 Design the data files for the systems.
	12.04 Design the processing flow of the system.
	12.05 Design a system to insure that only valid data is accepted and processed, completely and accurately.
	12.06 Establish a project plan for the development and implementation of the systems.
	12.07 Program and test the system.
	12.08 Develop the final systems documentation.
	12.09 Conduct necessary training and file conversion to properly implement the system.
	12.10 Understand industry-standard models for developing and maintaining software.
	12.11 Be able to use industry-standard project tools.
13.0	Understand database management systems. – The student will be able to:
	13.01 Understand the role of databases and how databases influence e-Business decisions.
	13.02 List the advantages and disadvantages of using databases.
	13.03 Understand the importance of data modeling as an analysis and communication tool.
	13.04 Describe the elements of a data model.
	13.05 Model the data requirements for sample e-Business problems.
	13.06 Understand the principles associated with the relational model.
	13.07 Understand the relationship between functional dependencies and keys.

	13.08 Determine the Normal form of a relation and execute the steps necessary to put the relation into the proper normal form.
	13.09 Define and contrast logical and physical keys.
	13.10 Understand the advantages and disadvantages of indexes.
	13.11 Understand the basic operators of relational algebra as a basis for retrieving data from relational databases.
	13.12 Create and use Structured Query Language (SQL) to retrieve data from a database.
14.0	Compare and contrast e-Business with traditional business models. – The student will be able to:
	14.01 Define and describe the evolution of e-Business.
	14.02 Describe how business operations have changed due to e-Business.
	14.03 Explain the basic business models of electronic marketing.
	14.04 Identify critical success factors for electronic marketing.
	14.05 Explain the impact of the Internet on customers and markets for businesses.
	14.06 Describe consumer buying behavior and organizational buying behavior.
	14.07 Explain how service industries conduct business electronically.
	14.08 Describe several innovative applications in the service sector.
	14.09 Identify the various payment options in e-commerce.
	14.10 Explain the strategic planning issues for e-Business.
	14.11 Identify the critical success factors of an e-Business project/venture.
	14.12 Describe the major components and impact of web-based economics.
15.0	Identify, classify and demonstrate management activities for e-Business. – The student will be able to:
	15.01 Define the role of the entrepreneur in global business.
	15.02 Describe the entrepreneurial profile.
	15.03 Discuss the role of the internet in helping small business expand their market.
	15.04 Explain the importance of strategic management to business.

15.05	Describe the components of a marketing plan and explain the benefits of preparing one.
15.06	Describe how to prepare financial statements and use them to manage the business.
15.07	Describe effective pricing strategies.
15.08	Discuss the links among pricing, image, and competition.
15.09	Explain what seed capital is and why it is so important to the entrepreneurial process.
15.10	Explain the difference in the three types of capital that small businesses require: Fixed, Working and Growth.
15.11	Explain the stages in the location decision.
15.12	Describe the location criteria and outline the basic location options for retail and service business.
15.13	Explain purchasing, quality control, vender analysis and managing inventory while using technology to gain a competitive edge.
15.14	Explain the challenges involved in the entrepreneur's role as leader and what it takes to be a successful leader.
15.15	Learn management succession and risk management strategies in family business together with ethics and social responsibility.
15.16	Describe, explain and discuss business's responsibility to employees, customers, investors and the community.
15.17	Describe management's historical role in business operations.
15.18	Compare and contrast different management philosophies.
15.19	Compare and contrast the employees' personal needs with those of the organization.
15.20	Describe methods managers can use to deal with management politics.
15.21	Describe the nature of management's legal environment for traditional and electronic environments.
15.22	Describe the planning process of managers.
15.23	Discuss the characteristics and functions of an organization chart.
15.24	Describe the act and benefits of delegation.
15.25	Summarize the components of job descriptions and specifications.
15.26	Define and describe the activities involved in making a job analysis.
15.27	Discuss potential problems in evaluating employees and methods to avoid problems.

15.28	Discuss strategies managers may use to build and sustain high morale and motivation.
15.29	Describe methods of direct and indirect compensation.
15.30	Describe various employee relations practices.
15.31	Summarize strategies to improve personal and organizational communication.
15.32	Discuss the role of information systems in the control system.
15.33	Discuss the steps in the basic decision making process.
15.34	Describe several factors that influence decision-making.
15.35	Distinguish among management functions.
15.36	Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
15.37	Select the most effective communication systems.
15.38	Identify problems and make an appropriate decision.
16.0	Identify legal and ethical issues for e-Business. – The student will be able to:
16.01	Describe the procedure to obtaining protection under intellectual property law.
16.02	Describe and recognize material that is defamatory.
16.03	Explain the right of publicity and the right of privacy.
16.04	Explain copyright assignment and the Visual Artists Rights Act.
16.05	Discuss licensing and registration issues.
16.06	Describe the importance in choosing a strong trademark.
16.07	Understand basic laws that apply to e-commerce.
16.08	Discuss the permission required for linking, revenue-sharing agreements, and liability issues pertaining to linking.
16.09	Explain other liability issues for ISPs.
16.10	Differentiate trademark protection and trade secret protection.

17.0	Accounting and finance activities. – The student will be able to:
17.01	Identify and understand accounting and financial concepts.
17.02	Describe and use financial analysis tools.
17.03	Perform standard accounting and bookkeeping functions.
17.04	Understand the impact and implications of federal auditing guidelines.
18.0	Perform marketing activities for e-Business. – The student will be able to:
18.01	Discuss what marketing is and why it is important to organizations and individuals.
18.02	Describe the key decisions in the development of corporate strategy.
18.03	Recognize the outcomes of consumers' decisions to purchase or not to purchase and how these affect marketing success.
18.04	Define and explain market segmentation, target markets, and product differentiation and positioning.
18.05	Describe the issues involved in product and brand positioning.
18.06	Differentiate between consumer and business products.
18.07	Describe the way marketing research is used in the new-product development process.
18.08	Identify many of the influences on marketers' pricing decisions.
18.09	Explain how consumers form perceptions of quality and value.
18.10	Explain the functions and key activities of marketing channels.
18.11	Distinguish between direct and indirect marketing channels.
18.12	Explain the key elements of the marketing communications process.
18.13	Describe the key activities in sales management.
18.14	Explain the difference between e-Business, e-commerce, and e-marketing.

Security Specialization	
19.0	Design, develop and implement physical, network, host, application and user security systems for e-Business. – The student will be able to:
	19.01 Explain use and purpose of security policies.
	19.02 Conduct a security audit.
	19.03 Control access to systems, resources and data.
	19.04 Explain and manage system security in common operating systems.
	19.05 Describe concepts of web servers and their role in the network.
	19.06 Design, implement and maintain a web server.
	19.07 Explain how documents and files are stored on a web server.
	19.08 Describe different methods for projecting future traffic on a web server.
	19.09 Identify the necessary steps to ensure reliability and response of the server.
	19.10 Describe and implement the process for effectively organizing a web site.
	19.11 Implement search engine optimization techniques.
	19.12 Set up the web server so that dynamic content can be provided to users of the web site.
	19.13 Analyze server log files to determine trends in web server utilization.
	19.14 Identify vulnerabilities in Internet protocols and counter-measures for securing them.
	19.15 Properly configure and describe the operation of naming and directory services.
	19.16 Describe the operation of authentication and auditing services protocols and how to effectively secure them.
	19.17 Describe the operation of administrative services protocols and how to effectively secure them.
	19.18 Describe the operation of the IP Security protocol.
20.0	Maintain and monitor security policies. – The student will be able to:
	20.01 Identify basic network security.
	20.02 Describe purpose and use of packet sniffing, firewalls and proxies.

20.03	Define web server security.
20.04	Protect against the risks of directory browsing.
20.05	Assess client security issues.
20.06	Install and configure network security tools.
20.07	Describe authentication and identification schemes.
20.08	Define secure software.
20.09	Describe the use and purpose of encryption.
20.10	Define the advantages of Secure Socket Layer (SSL).
20.11	Define certificate authority.
20.12	Identify basic aspects of intrusion detection and steps to protect the web server from these threats.
20.13	Describe cryptographic attack models.
20.14	Describe the secret key and public key encryption methodology.
20.15	Use hashing techniques.
20.16	Use digital signatures in a network environment.
20.17	Use authentication processes in heterogeneous environments.
20.18	Create secure environment through defensive programming.
20.19	Explain the basic elements of Security Testing and Auditing.
20.20	Describe the capabilities of effective signature filter techniques.
20.21	Explain the importance of architectural design detection of intrusions.
20.22	Define and utilize various network based Intrusion Detection Solutions (IDS).
20.23	Explain intrusion detection and denial of service.
20.24	Issue and manage digital certificates.

Software Specialization	
19.0	Use various programming software applications, languages and protocols for e-Business environment. – The student will be able to:
19.01	Describe Internet Protocols.
19.02	Explain how applets differ from applications in terms of program form, operating context, and how they are started.
19.03	Describe and use single- and multi-dimensional arrays.
19.04	Create classes that use inheritance aspects of the object-oriented paradigm.
19.05	Describe the error handling constructs.
19.06	Write a program that reads and writes text files.
19.07	Understand the hierarchy of classes designed for aggregate data.
19.08	Identify deprecated classes, and explain how to migrate.
19.09	Explain and use event handling in a GUI.
19.10	Differentiate between client-side scripting and server-side scripting.
19.11	Manipulate the objects contained in the Document Object Model (DOM).
19.12	Use variables, constants, and arithmetic operators to create valid arithmetic expressions.
19.13	Dynamically alter the sequence of code execution.
19.14	Use built-in functions as well as create custom functions, subroutines, and procedures within software using scripting languages.
19.15	Create server pages using languages.
19.16	Write programs in a language that implement network connection objects.
19.17	Create and use server-side include files.
19.18	Understand appropriate use of and demonstrate ability to incorporate and utilize cookies in e-Business software.
19.19	Integrate standard object model components with server pages.
19.20	Create web page using data from a database.
19.21	Implement programs that use local or remote databases with standard protocols.

19.22	Use a scripting language on the server side of a distributed program.
19.23	Use a scripting language on the client side of a distributed program.
19.24	Implement levels of security in distributed software applications.
19.25	Read simple UML diagrams, and create UML documents that model programs.
19.26	Use built-in objects for error handling, file creation, and dictionary access in e-Business software.
19.27	Understand the use of client-side operating system tools.
19.28	Produce software that can interface with operating system services used to broadcast messages within a domain.
19.29	Utilize appropriate operating system interfaces to redirect output.
19.30	Describe various name space models.
19.31	Register and query a service.
19.32	Use transport service providers and name space service providers.
19.33	Explain and implement XML-related technologies.
19.34	Explain and use the different elements that make code easier to read.
19.35	Explain and use the different data types available in scripting languages.
19.36	Explain and use standard control structures such as repetition, selection, and sequence in the appropriate programming language.
19.37	Output data from scripting language.
19.38	Explain the benefits of using subroutines and libraries in code.
19.39	Debug code from scripting languages.
19.40	Explain basic Internet and server-side scripting security issues and common techniques to fix them.
19.41	Use a scripting language to create and manage form data submitted over the Internet.
19.42	Examine the use of shopping carts on the Internet and how scripting languages can be used in these applications.
19.43	Examine the use of auctions via the Internet and scripting languages.
19.44	Understand industry standard program design techniques.

19.45	Develop the logic for a program using both flowcharting and pseudo code.
19.46	Develop looping and nested looping logic.
19.47	Develop the logic of: three-level control break program, an extract program, an edit program, a file matching and an update program.
20.0	Develop software applications for e-Business environment. – The student will be able to:
20.01	Design software applications that are accessible by a variety of wireless and wired devices.
20.02	Explain alternatives to create dynamic content.
20.03	Integrate the push model of information delivery.
20.04	Use operating system services such as a personal web server for database development.
20.05	Explain server security and permissions.
20.06	Evaluate the advantages/disadvantages of different server platforms.
20.07	Explain scripting concepts and syntax.
20.08	Connect common databases using standard protocols.
20.09	Display data from a database using a Web interface.
20.10	Write and modify a database record using a Web interface.
20.11	Enable Web security features.
20.12	Design and implement a basic shopping cart application.

Technology Specialization	
19.0	Perform web server management activities. – The student will be able to:
	19.01 Perform console management in the author and user mode.
	19.02 Create and navigate a custom management console.
	19.03 Create new user accounts.
	19.04 Implement groups into a domain.
	19.05 Change the domain mode.
	19.06 Manage software settings, scripts, and security settings.
	19.07 Manage administrative templates.
	19.08 Manage folder redirection.
	19.09 Configure and administer network printers.
20.0	Support e-Business applications and product development. – The student will be able to:
	20.01 Identify the different components to systems development life cycle and how they are interrelated.
	20.02 Identify deliverables for user project and build subprojects within lifecycle components.
	20.03 Create physical structure of web-based architecture.
	20.04 Create requirements for business request, develop web components necessary to satisfy request and test for acceptance.
	20.05 Use web browser and web authoring tools.
	20.06 Write required queries to get required answer sets.
21.0	Maintain network infrastructure. – The student will be able to:
	21.01 Identify Web server hardware and discus performance evaluation.
	21.02 Describe security threat countermeasures, including anti-virus software and encryption.
	21.03 Identify basic components of electronic payment systems.
	21.04 Identify how to create and maintain an effective Web presence and brand.

21.05	Describe various Electronic Data Interchange components.
21.06	Define and explain virtual communities and Web portals.
21.07	Identify challenges of a global business regarding culture, legal and financial impacts, and differing languages.
21.08	Identify the planning stages of the e-Business project.
22.0	Design, integrate and deploy e-Business systems. – The student will be able to:
22.01	Describe the lifecycle of an e-Business.
22.02	Explain Web site information architecture design principles.
22.03	Identify e-Business systems development strategies.
22.04	Explain integration with LDAP, Messaging, and Collaboration.
22.05	Identify and describe the use of Meta Directories, Content Syndication, Single Sign-on, and Search Engines.
22.06	Identify deployment strategies and Middleware.
22.07	Identify Application Server Systems Architectures.
22.08	Explain Transaction Processing (TP) monitor systems architecture.
22.09	Identify integration solutions.
23.0	Perform technical requirements to support UNIX operating system. – The student will be able to:
23.01	Explain basic command syntax for approximately 100 common shell commands governing the file-system, printing and process control.
23.02	Identify and use the editors.
23.03	Schedule and reprioritize processes.
23.04	Use commands to get information and communicate with remote users.
23.05	Search for strings of text in files using shell meta-characters.
23.06	Use common tools to generate reports or filter text.
23.07	Use shell scripts to control flow, input, output and jobs.
23.08	Troubleshoot system problems.

24.0	Maintain systems quality and perform testing activities. – The student will be able to:
24.01	Identify the advantages and disadvantages of client-server computing.
24.02	Establish controls in a client-server framework.
24.03	Explain software testing methodology.
24.04	Describe the planning, executing and controlling of the testing process.
24.05	Perform Graphical User Interface testing.
24.06	Explain the server applications testing processes.
24.07	Explain testing in a networked application environment.
24.08	Incorporate cross-level functional testing within a data-driven framework-based environment.
24.09	Use client-server testing metrics.
24.10	Explain testing integration on the desktop.
24.11	Explain testing for web-based client-server applications.
24.12	Select and use appropriate automated test tools.

Business Specialization	
19.0	Perform management activities to support human resources in an e-Business environment. – The student will be able to:
19.01	Identify career choice in human resources.
19.02	Describe the components of the job requirement and analysis process.
19.03	Describe the important elements of effective human resource planning.
19.04	Discuss the performance appraisal and the uses of the performance appraisal.
19.05	Compare training options available to organizations.
19.06	Discuss strategies to improve organizational performance.
19.07	Describe various ways of compensating employees.
19.08	Summarize the legal regulations of compensation systems.
19.09	Explain the importance of retaining employees.
19.10	Discuss the importance of safety and health laws and standards.
19.11	Describe how to create a safe and healthy work environment.
19.12	Describe labor relations and collective bargaining.
20.0	Perform activities to enhance supply chain management. – The student will be able to:
20.01	Explain the electronic environment of the supply chain.
20.02	Explain the importance of information in an integrated supply chain.
20.03	Explain the technological applications for supply chain management.
20.04	Discuss how to engineer or reengineer the supply chain for optimal materials planning and handling.
20.05	Explain how relationships are important to the supply chain.
20.06	Explain the importance of suppliers in the supply chain.
20.07	Describe how to resolve conflicts in the supply chain.
20.08	Explain the laws and regulations regarding "order taking".
20.09	Describe the components involved in an international supply chain management system.

21.0	Use various models and strategies for e-Business. – The student will be able to:
21.01	Explain the components, linkages, and evaluation of Business Models and their relationship with e-Business.
21.02	Describe the competitive environment and how it can affect an Internet business.
21.03	Describe the current strengths, weaknesses, opportunities, and threats to Internet business.
21.04	Describe the limitations to transactions over the Internet.
21.05	Describe the process of valuing and financing an Internet start-up.
21.06	Describe macro environments and the impact on performance.
21.07	Explain the differences between incumbents and new entrants.
22.0	Perform customer service techniques for e-Business. – The student will be able to:
22.01	Define customer service.
22.02	Discuss solutions to overcoming obstacles in customer service.
22.03	Define service culture in organizations.
22.04	Describe management's role in customer service formulation.
22.05	Describe employee empowerment and its importance in providing good customer service.
22.06	Explain the role of communicating in customer service.
22.07	Determine strategies for working with various customer behaviors.
23.0	Perform selling techniques for e-Business. – The student will be able to:
23.01	Describe the relationship of personal selling to market-driven economies.
23.02	Identify career opportunities in the field of selling.
23.03	Explain the importance of relationship skills in personal selling.
23.04	Explain the importance of projecting a positive self-image.
23.05	Discuss communication-style bias and how it influences the relationship process.
23.06	Identify reasons why salespeople and customers benefit from thorough product knowledge.

23.07 List major sources of product information.
23.08 Discuss the evolving role of strategic selling.
23.09 Discuss the factors that influence people to make buying decisions.
23.10 Explain how to plan a sales presentation.
23.11 List criterion for qualifying and organizing prospects.
23.12 List guidelines for effective demonstrations.
23.13 Outline general strategies for negotiating buyer resistance.
23.14 Describe the proper attitude to display toward closing the sale.
23.15 List guidelines for closing the sale.
23.16 Explain how customer service can stimulate repeat business and referrals.
23.17 Describe how to properly handle activities that are part of the customer service program.
23.18 Describe the functions of a sales manager.
23.19 Explain how to manage time wisely.
23.20 List factors that influence the ethical conduct of sales personnel.
23.21 List and describe the functions of telemarketing.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the appropriate career and technical student organizations for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

Certified Internet Web (CIW) – E-Commerce Designer (PROSO003) – 3 credits
CompTIA Security+ (COMPT003) – 3 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp .

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 63 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

E-Business Security Technical Certificate (0552120102) – 24 credit hours
E-Business Software Technical Certificate (0552120103) – 21 credit hours
E-Business Technical Certificate (0552120101) – 24 credit hours
E-Business Technology Technical Certificate (0552120104) – 21 credit hours
E-Business Ventures Technical Certificate (0552120105) – 24 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **E-Business Technology (60)**
Career Cluster: **Information Technology**

AS	
CIP Number	1552120107
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Others
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in E-Business such as computer specialists, database technicians, security specialists, Web content specialists, developers, technical, systems, and network analysts, Web security specialists, and Internet technical support specialists in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

This program focuses on a balance of business and technology components and allows the student to gain additional skills in one of four areas of specialization: Business, Technology, Software, and Security.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate comprehension and communication skills.
02.0 Demonstrate professional development skills.
03.0 Perform documentation and technical reference activities.
04.0 Demonstrate employment skills.
05.0 Perform general organizational workplace competencies.
06.0 Demonstrate knowledge of legal and ethical issues.
07.0 Perform project management activities.
08.0 Understand issues related to e-Business.
09.0 Understand local area networks.
10.0 Demonstrate proficiency in microcomputer operating systems and software.
11.0 Perform Web authoring activities.
12.0 Conduct systems analysis and design.
13.0 Understand database management systems.
14.0 Compare and contrast e-Business with traditional business.
15.0 Identify, classify and demonstrate management activities for e-Business.
16.0 Identify legal and ethical issues for e-Business.
17.0 Accounting and finance activities.
18.0 Perform marketing activities for e-Business.

In addition to the above core outcomes, the student will successfully complete the outcomes in at least one of the following specializations:

Security Specialization

19.0 Design, develop and implement physical, network, host, application, and user security systems for e-Business.
20.0 Maintain and monitor security policies.

Software Specialization

19.0 Use various programming software applications, languages and protocols for e-Business environment.
20.0 Develop software applications for e-Business environment.

Technology Specialization

19.0 Perform Web Server Management activities.
20.0 Support e-Business applications and product development.
21.0 Maintain network infrastructure.

22.0 Design, integrate and deploy e-Business systems.
23.0 Perform technical requirements to support UNIX operating system.
24.0 Maintain systems quality and perform testing activities.

Business Specialization

19.0 Perform management activities to support human resources in e-Business environment.
20.0 Perform activities to enhance supply chain management in e-Business.
21.0 Use various models and strategies for e-Business.
22.0 Perform customer service techniques for e-Business.
23.0 Perform selling techniques for e-Business.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Technology**
CIP Number: **1552120100**
Program Length: **60 credit hours**
SOC Code(s): **15-1199**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:	
01.0	Demonstrate comprehension and communication skills. – The student will be able to:
01.01	Read and discuss work from different professional journals related to the course content.
01.02	Use reference sources such as books, magazines, and electronic databases to gather and critically evaluate materials.
01.03	Prepare, outline and deliver an oral report with appropriate materials.
01.04	Participate in group discussions as a member and as a leader.
01.05	Follow written and oral technical instructions.
01.06	Read and understand graphs, charts, diagrams and tables commonly used in this industry/occupation.
02.0	Demonstrate professional development skills. – The student will be able to:
02.01	Identify corporate strategies and policies.
02.02	Maintain professional contact for future projects.
02.03	Facilitate mentor relationships.
02.04	Network with local professionals in the industry.
02.05	Understand the importance of attending seminars, workshops, and tradeshows.
03.0	Perform documentation and technical reference activities. – The student will be able to:
03.01	Use technical vocabulary appropriately.
03.02	Locate information in technical references.
03.03	Prepare technical reports.

	03.04 Describe appropriate documentation procedures and practices.
	03.05 Produce and maintain system documentation.
	03.06 Perform documentation and technical reference activities.
	03.07 Cite correctly Internet-based resources using proper format.
	03.08 Research industry trends on the Internet.
04.0	Demonstrate employment skills. – The student will be able to:
	04.01 Identify appropriate attire and grooming for a business office.
	04.02 Conduct a job search.
	04.03 Demonstrate job interview skills.
	04.04 Identify methods for securing an employment references.
	04.05 Identify and discuss issues contained within professional codes of conduct.
	04.06 Use appropriate communication skills, courtesy, manners, and dress in the workplace.
	04.07 Identify acceptable work habits.
	04.08 Identify and use acceptable strategies for resolving conflict in the workplace.
	04.09 Identify and demonstrate appropriate responses to criticism from employers, supervisor, or other employees.
	04.10 Apply principles and techniques for working productively with people of diverse cultures and backgrounds.
	04.11 Identify techniques for stress management and prevention of job burn-out.
	04.12 Use appropriate communication skills, telephone etiquette, courtesy, and manners when dealing with customers.
	04.13 Demonstrate knowledge of how to make appropriate job changes.
05.0	Perform general organizational workplace competencies. – The student will be able to:
	05.01 Follow oral and written instructions.
	05.02 Prepare, outline, and deliver a short oral presentation.
	05.03 Participate in group discussion as a member and as a leader.

05.04	Prepare visual material to support an oral presentation.
05.05	List the steps in problem solving.
05.06	Choose appropriate action in situations requiring effective time management.
05.07	Apply principles and techniques for being a productive, contributing member of a team.
05.08	Communicate effectively with individuals lacking a technical background.
05.09	Identify clear detailed technical oral instructions.
05.10	Identify examples of effective strategies to fulfill end user needs training strategies and techniques.
05.11	Identify strategies to build mutual trust, respect, and cooperation among team members.
05.12	Apply techniques for organizing and planning of time and resources to complete an assigned task.
05.13	Apply active listening techniques in interpersonal communications.
05.14	Identify strategies to improve and maximize productivity in the workplace.
05.15	Brainstorm techniques such as brainstorming to generate ideas and suggestions to achieve a task.
05.16	Analyze alternatives and compare costs and benefits in determining the best solution.
06.0	Demonstrate knowledge of legal and ethical issues. – The student will be able to:
06.01	Correctly cite or attribute sources.
06.02	Use copyrighted materials appropriately.
06.03	Identify the types of works that are protected by intellectual property laws.
06.04	Discuss the basic elements of a contract.
06.05	Explain laws regarding e-mail litigation, including anti-spam laws.
06.06	Discuss e-mail use and ownership.
06.07	Describe customer and employee privacy issues and safeguards.
06.08	Develop examples of acceptable use policies.
06.09	Compare organizational codes of ethics.
06.10	Research and write a personal code of ethics.

07.0	Perform project management activities. – The student will be able to:
	07.01 Describe the role of project management (PM) within the organization.
	07.02 Identify the strengths and weaknesses of various project life cycle designs.
	07.03 Demonstrate the importance of project scope management.
	07.04 Compare and contrast project selection methods.
	07.05 Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe those different elements.
	07.06 Compare and contrast types of cost estimates.
	07.07 Examine cost control and earned value analysis.
	07.08 Examine organizational planning, staff acquisition, and team development.
	07.09 Examine risk identification, quantification, response development, and response control.
	07.10 Compare and contrast project tracking and project reporting.
	07.11 Understand change control and configuration control.
	07.12 Understand subcontracting and outsourcing.
	07.13 Discuss and analyze project management case studies.
08.0	Understand issues related to e-Business. – The student will be able to:
	08.01 Explain the difference between intranet and the Internet and the role of each in e-Business.
	08.02 Explain the history, purpose and use of the World Wide Web and how it has enabled e-Business.
	08.03 Describe the rise of various e-Business models.
	08.04 Explain security issues related to electronic payment.
	08.05 Explain issues of advertising, marketing and solicitation activities affecting e-Business.
09.0	Understand local area networks. – The student will be able to:
	09.01 Identify and explain the main purpose of various communication hardware devices, communication media, and protocols.
	09.02 Describe various network topologies.

	09.03 Differentiate between the OSI reference model and the TCP/IP protocol architecture.
	09.04 Differentiate between analog and digital signals.
	09.05 Describe various transmission media and how devices such as modems work.
	09.06 Explain collision occurrences and detection.
	09.07 Explain the factors and techniques for data transportation.
10.0	Demonstrate proficiency in microcomputer operating systems and software. – The student will be able to:
	10.01 Describe the historical development of computer operating software.
	10.02 Describe the major hardware and related software of microcomputers.
	10.03 Describe the various operating systems.
	10.04 Explain system and application architectures.
	10.05 Describe various media and file formats.
	10.06 Use various software applications, including word processors, spreadsheets, databases, presentation software, and appointment scheduling applications.
	10.07 Identify the major programming languages used in business data processing.
11.0	Perform web authoring activities to support e-Business. – The student will be able to:
	11.01 Identify and describe the components of an HTML document.
	11.02 Create lists in an HTML document.
	11.03 Recognize the various layouts used in web site design.
	11.04 Use storyboarding to design a comprehensive web site.
	11.05 Create links between HTML documents within a web site and to external HTML documents.
	11.06 Create tables.
	11.07 Add images to Web pages.
	11.08 Use CSS to customize web page styles.
	11.09 Create image maps.

	11.10 Identify elements of HTML fill-in forms.
	11.11 Describe the various CGI scripting languages used in a Web site.
	11.12 Identify and use client side programming technologies.
12.0	Conduct systems analysis and design. – The student will be able to:
	12.01 Perform a detailed systems investigation and analysis of the project.
	12.02 Design the input and output for the system.
	12.03 Design the data files for the systems.
	12.04 Design the processing flow of the system.
	12.05 Design a system to insure that only valid data is accepted and processed, completely and accurately.
	12.06 Establish a project plan for the development and implementation of the systems.
	12.07 Program and test the system.
	12.08 Develop the final systems documentation.
	12.09 Conduct necessary training and file conversion to properly implement the system.
	12.10 Understand industry-standard models for developing and maintaining software.
	12.11 Be able to use industry-standard project tools.
13.0	Understand database management systems. – The student will be able to:
	13.01 Understand the role of databases and how databases influence e-Business decisions.
	13.02 List the advantages and disadvantages of using databases.
	13.03 Understand the importance of data modeling as an analysis and communication tool.
	13.04 Describe the elements of a data model.
	13.05 Model the data requirements for sample e-Business problems.
	13.06 Understand the principles associated with the relational model.
	13.07 Understand the relationship between functional dependencies and keys.

	13.08 Determine the Normal form of a relation and execute the steps necessary to put the relation into the proper normal form.
	13.09 Define and contrast logical and physical keys.
	13.10 Understand the advantages and disadvantages of indexes.
	13.11 Understand the basic operators of relational algebra as a basis for retrieving data from relational databases.
	13.12 Create and use Structured Query Language (SQL) to retrieve data from a database.
14.0	Compare and contrast e-Business with traditional business models. – The student will be able to:
	14.01 Define and describe the evolution of e-Business.
	14.02 Describe how business operations have changed due to e-Business.
	14.03 Explain the basic business models of electronic marketing.
	14.04 Identify critical success factors for electronic marketing.
	14.05 Explain the impact of the Internet on customers and markets for businesses.
	14.06 Describe consumer buying behavior and organizational buying behavior.
	14.07 Explain how service industries conduct business electronically.
	14.08 Describe several innovative applications in the service sector.
	14.09 Identify the various payment options in e-commerce.
	14.10 Explain the strategic planning issues for e-Business.
	14.11 Identify the critical success factors of an e-Business project/venture.
	14.12 Describe the major components and impact of web-based economics.
15.0	Identify, classify and demonstrate management activities for e-Business. – The student will be able to:
	15.01 Define the role of the entrepreneur in global business.
	15.02 Describe the entrepreneurial profile.
	15.03 Discuss the role of the internet in helping small business expand their market.
	15.04 Explain the importance of strategic management to business.

15.05	Describe the components of a marketing plan and explain the benefits of preparing one.
15.06	Describe how to prepare financial statements and use them to manage the business.
15.07	Describe effective pricing strategies.
15.08	Discuss the links among pricing, image, and competition.
15.09	Explain what seed capital is and why it is so important to the entrepreneurial process.
15.10	Explain the difference in the three types of capital that small businesses require: Fixed, Working and Growth.
15.11	Explain the stages in the location decision.
15.12	Describe the location criteria and outline the basic location options for retail and service business.
15.13	Explain purchasing, quality control, vender analysis and managing inventory while using technology to gain a competitive edge.
15.14	Explain the challenges involved in the entrepreneur's role as leader and what it takes to be a successful leader.
15.15	Learn management succession and risk management strategies in family business together with ethics and social responsibility.
15.16	Describe, explain and discuss business's responsibility to employees, customers, investors and the community.
15.17	Describe management's historical role in business operations.
15.18	Compare and contrast different management philosophies.
15.19	Compare and contrast the employees' personal needs with those of the organization.
15.20	Describe methods managers can use to deal with management politics.
15.21	Describe the nature of management's legal environment for traditional and electronic environments.
15.22	Describe the planning process of managers.
15.23	Discuss the characteristics and functions of an organization chart.
15.24	Describe the act and benefits of delegation.
15.25	Summarize the components of job descriptions and specifications.
15.26	Define and describe the activities involved in making a job analysis.
15.27	Discuss potential problems in evaluating employees and methods to avoid problems.

15.28	Discuss strategies managers may use to build and sustain high morale and motivation.
15.29	Describe methods of direct and indirect compensation.
15.30	Describe various employee relations practices.
15.31	Summarize strategies to improve personal and organizational communication.
15.32	Discuss the role of information systems in the control system.
15.33	Discuss the steps in the basic decision making process.
15.34	Describe several factors that influence decision-making.
15.35	Distinguish among management functions.
15.36	Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
15.37	Select the most effective communication systems.
15.38	Identify problems and make an appropriate decision.
16.0	Identify legal and ethical issues for e-Business. – The student will be able to:
16.01	Describe the procedure to obtaining protection under intellectual property law.
16.02	Describe and recognize material that is defamatory.
16.03	Explain the right of publicity and the right of privacy.
16.04	Explain copyright assignment and the Visual Artists Rights Act.
16.05	Discuss licensing and registration issues.
16.06	Describe the importance in choosing a strong trademark.
16.07	Understand basic laws that apply to e-commerce.
16.08	Discuss the permission required for linking, revenue-sharing agreements, and liability issues pertaining to linking.
16.09	Explain other liability issues for ISPs.
16.10	Differentiate trademark protection and trade secret protection.

17.0	Accounting and finance activities. – The student will be able to:
17.01	Identify and understand accounting and financial concepts.
17.02	Describe and use financial analysis tools.
17.03	Perform standard accounting and bookkeeping functions.
17.04	Understand the impact and implications of federal auditing guidelines.
18.0	Perform marketing activities for e-Business. – The student will be able to:
18.01	Discuss what marketing is and why it is important to organizations and individuals.
18.02	Describe the key decisions in the development of corporate strategy.
18.03	Recognize the outcomes of consumers' decisions to purchase or not to purchase and how these affect marketing success.
18.04	Define and explain market segmentation, target markets, and product differentiation and positioning.
18.05	Describe the issues involved in product and brand positioning.
18.06	Differentiate between consumer and business products.
18.07	Describe the way marketing research is used in the new-product development process.
18.08	Identify many of the influences on marketers' pricing decisions.
18.09	Explain how consumers form perceptions of quality and value.
18.10	Explain the functions and key activities of marketing channels.
18.11	Distinguish between direct and indirect marketing channels.
18.12	Explain the key elements of the marketing communications process.
18.13	Describe the key activities in sales management.
18.14	Explain the difference between e-Business, e-commerce, and e-marketing.

Security Specialization	
19.0	Design, develop and implement physical, network, host, application and user security systems for e-Business. – The student will be able to:
	19.01 Explain use and purpose of security policies.
	19.02 Conduct a security audit.
	19.03 Control access to systems, resources and data.
	19.04 Explain and manage system security in common operating systems.
	19.05 Describe concepts of web servers and their role in the network.
	19.06 Design, implement and maintain a web server.
	19.07 Explain how documents and files are stored on a web server.
	19.08 Describe different methods for projecting future traffic on a web server.
	19.09 Identify the necessary steps to ensure reliability and response of the server.
	19.10 Describe and implement the process for effectively organizing a web site.
	19.11 Implement search engine optimization techniques.
	19.12 Set up the web server so that dynamic content can be provided to users of the web site.
	19.13 Analyze server log files to determine trends in web server utilization.
	19.14 Identify vulnerabilities in Internet protocols and counter-measures for securing them.
	19.15 Properly configure and describe the operation of naming and directory services.
	19.16 Describe the operation of authentication and auditing services protocols and how to effectively secure them.
	19.17 Describe the operation of administrative services protocols and how to effectively secure them.
	19.18 Describe the operation of the IP Security protocol.
20.0	Maintain and monitor security policies. – The student will be able to:
	20.01 Identify basic network security.
	20.02 Describe purpose and use of packet sniffing, firewalls and proxies.

20.03	Define web server security.
20.04	Protect against the risks of directory browsing.
20.05	Assess client security issues.
20.06	Install and configure network security tools.
20.07	Describe authentication and identification schemes.
20.08	Define secure software.
20.09	Describe the use and purpose of encryption.
20.10	Define the advantages of Secure Socket Layer (SSL).
20.11	Define certificate authority.
20.12	Identify basic aspects of intrusion detection and steps to protect the web server from these threats.
20.13	Describe cryptographic attack models.
20.14	Describe the secret key and public key encryption methodology.
20.15	Use hashing techniques.
20.16	Use digital signatures in a network environment.
20.17	Use authentication processes in heterogeneous environments.
20.18	Create secure environment through defensive programming.
20.19	Explain the basic elements of Security Testing and Auditing.
20.20	Describe the capabilities of effective signature filter techniques.
20.21	Explain the importance of architectural design detection of intrusions.
20.22	Define and utilize various network based Intrusion Detection Solutions (IDS).
20.23	Explain intrusion detection and denial of service.
20.24	Issue and manage digital certificates.

Software Specialization	
19.0	Use various programming software applications, languages and protocols for e-Business environment. – The student will be able to:
19.01	Describe Internet Protocols.
19.02	Explain how applets differ from applications in terms of program form, operating context, and how they are started.
19.03	Describe and use single- and multi-dimensional arrays.
19.04	Create classes that use inheritance aspects of the object-oriented paradigm.
19.05	Describe the error handling constructs.
19.06	Write a program that reads and writes text files.
19.07	Understand the hierarchy of classes designed for aggregate data.
19.08	Identify deprecated classes, and explain how to migrate.
19.09	Explain and use event handling in a GUI.
19.10	Differentiate between client-side scripting and server-side scripting.
19.11	Manipulate the objects contained in the Document Object Model (DOM).
19.12	Use variables, constants, and arithmetic operators to create valid arithmetic expressions.
19.13	Dynamically alter the sequence of code execution.
19.14	Use built-in functions as well as create custom functions, subroutines, and procedures within software using scripting languages.
19.15	Create server pages using languages.
19.16	Write programs in a language that implement network connection objects.
19.17	Create and use server-side include files.
19.18	Understand appropriate use of and demonstrate ability to incorporate and utilize cookies in e-Business software.
19.19	Integrate standard object model components with server pages.
19.20	Create web page using data from a database.
19.21	Implement programs that use local or remote databases with standard protocols.

19.22	Use a scripting language on the server side of a distributed program.
19.23	Use a scripting language on the client side of a distributed program.
19.24	Implement levels of security in distributed software applications.
19.25	Read simple UML diagrams, and create UML documents that model programs.
19.26	Use built-in objects for error handling, file creation, and dictionary access in e-Business software.
19.27	Understand the use of client-side operating system tools.
19.28	Produce software that can interface with operating system services used to broadcast messages within a domain.
19.29	Utilize appropriate operating system interfaces to redirect output.
19.30	Describe various name space models.
19.31	Register and query a service.
19.32	Use transport service providers and name space service providers.
19.33	Explain and implement XML-related technologies.
19.34	Explain and use the different elements that make code easier to read.
19.35	Explain and use the different data types available in scripting languages.
19.36	Explain and use standard control structures such as repetition, selection, and sequence in the appropriate programming language.
19.37	Output data from scripting language.
19.38	Explain the benefits of using subroutines and libraries in code.
19.39	Debug code from scripting languages.
19.40	Explain basic Internet and server-side scripting security issues and common techniques to fix them.
19.41	Use a scripting language to create and manage form data submitted over the Internet.
19.42	Examine the use of shopping carts on the Internet and how scripting languages can be used in these applications.
19.43	Examine the use of auctions via the Internet and scripting languages.
19.44	Understand industry standard program design techniques.

19.45	Develop the logic for a program using both flowcharting and pseudo code.
19.46	Develop looping and nested looping logic.
19.47	Develop the logic of: three-level control break program, an extract program, an edit program, a file matching and an update program.
20.0	Develop software applications for e-Business environment. – The student will be able to:
20.01	Design software applications that are accessible by a variety of wireless and wired devices.
20.02	Explain alternatives to create dynamic content.
20.03	Integrate the push model of information delivery.
20.04	Use operating system services such as a personal web server for database development.
20.05	Explain server security and permissions.
20.06	Evaluate the advantages/disadvantages of different server platforms.
20.07	Explain scripting concepts and syntax.
20.08	Connect common databases using standard protocols.
20.09	Display data from a database using a Web interface.
20.10	Write and modify a database record using a Web interface.
20.11	Enable Web security features.
20.12	Design and implement a basic shopping cart application.

Technology Specialization	
19.0	Perform web server management activities. – The student will be able to:
	19.01 Perform console management in the author and user mode.
	19.02 Create and navigate a custom management console.
	19.03 Create new user accounts.
	19.04 Implement groups into a domain.
	19.05 Change the domain mode.
	19.06 Manage software settings, scripts, and security settings.
	19.07 Manage administrative templates.
	19.08 Manage folder redirection.
	19.09 Configure and administer network printers.
20.0	Support e-Business applications and product development. – The student will be able to:
	20.01 Identify the different components to systems development life cycle and how they are interrelated.
	20.02 Identify deliverables for user project and build subprojects within lifecycle components.
	20.03 Create physical structure of web-based architecture.
	20.04 Create requirements for business request, develop web components necessary to satisfy request and test for acceptance.
	20.05 Use web browser and web authoring tools.
	20.06 Write required queries to get required answer sets.
21.0	Maintain network infrastructure. – The student will be able to:
	21.01 Identify Web server hardware and discus performance evaluation.
	21.02 Describe security threat countermeasures, including anti-virus software and encryption.
	21.03 Identify basic components of electronic payment systems.
	21.04 Identify how to create and maintain an effective Web presence and brand.

21.05	Describe various Electronic Data Interchange components.
21.06	Define and explain virtual communities and Web portals.
21.07	Identify challenges of a global business regarding culture, legal and financial impacts, and differing languages.
21.08	Identify the planning stages of the e-Business project.
22.0	Design, integrate and deploy e-Business systems. – The student will be able to:
22.01	Describe the lifecycle of an e-Business.
22.02	Explain Web site information architecture design principles.
22.03	Identify e-Business systems development strategies.
22.04	Explain integration with LDAP, Messaging, and Collaboration.
22.05	Identify and describe the use of Meta Directories, Content Syndication, Single Sign-on, and Search Engines.
22.06	Identify deployment strategies and Middleware.
22.07	Identify Application Server Systems Architectures.
22.08	Explain Transaction Processing (TP) monitor systems architecture.
22.09	Identify integration solutions.
23.0	Perform technical requirements to support UNIX operating system. – The student will be able to:
23.01	Explain basic command syntax for approximately 100 common shell commands governing the file-system, printing and process control.
23.02	Identify and use the editors.
23.03	Schedule and reprioritize processes.
23.04	Use commands to get information and communicate with remote users.
23.05	Search for strings of text in files using shell meta-characters.
23.06	Use common tools to generate reports or filter text.
23.07	Use shell scripts to control flow, input, output and jobs.
23.08	Troubleshoot system problems.

24.0	Maintain systems quality and perform testing activities. – The student will be able to:
24.01	Identify the advantages and disadvantages of client-server computing.
24.02	Establish controls in a client-server framework.
24.03	Explain software testing methodology.
24.04	Describe the planning, executing and controlling of the testing process.
24.05	Perform Graphical User Interface testing.
24.06	Explain the server applications testing processes.
24.07	Explain testing in a networked application environment.
24.08	Incorporate cross-level functional testing within a data-driven framework-based environment.
24.09	Use client-server testing metrics.
24.10	Explain testing integration on the desktop.
24.11	Explain testing for web-based client-server applications.
24.12	Select and use appropriate automated test tools.

Business Specialization	
19.0	Perform management activities to support human resources in an e-Business environment. – The student will be able to:
19.01	Identify career choice in human resources.
19.02	Describe the components of the job requirement and analysis process.
19.03	Describe the important elements of effective human resource planning.
19.04	Discuss the performance appraisal and the uses of the performance appraisal.
19.05	Compare training options available to organizations.
19.06	Discuss strategies to improve organizational performance.
19.07	Describe various ways of compensating employees.
19.08	Summarize the legal regulations of compensation systems.
19.09	Explain the importance of retaining employees.
19.10	Discuss the importance of safety and health laws and standards.
19.11	Describe how to create a safe and healthy work environment.
19.12	Describe labor relations and collective bargaining.
20.0	Perform activities to enhance supply chain management. – The student will be able to:
20.01	Explain the electronic environment of the supply chain.
20.02	Explain the importance of information in an integrated supply chain.
20.03	Explain the technological applications for supply chain management.
20.04	Discuss how to engineer or reengineer the supply chain for optimal materials planning and handling.
20.05	Explain how relationships are important to the supply chain.
20.06	Explain the importance of suppliers in the supply chain.
20.07	Describe how to resolve conflicts in the supply chain.
20.08	Explain the laws and regulations regarding "order taking".
20.09	Describe the components involved in an international supply chain management system.

21.0	Use various models and strategies for e-Business. – The student will be able to:
21.01	Explain the components, linkages, and evaluation of Business Models and their relationship with e-Business.
21.02	Describe the competitive environment and how it can affect an Internet business.
21.03	Describe the current strengths, weaknesses, opportunities, and threats to Internet business.
21.04	Describe the limitations to transactions over the Internet.
21.05	Describe the process of valuing and financing an Internet start-up.
21.06	Describe macro environments and the impact on performance.
21.07	Explain the differences between incumbents and new entrants.
22.0	Perform customer service techniques for e-Business. – The student will be able to:
22.01	Define customer service.
22.02	Discuss solutions to overcoming obstacles in customer service.
22.03	Define service culture in organizations.
22.04	Describe management's role in customer service formulation.
22.05	Describe employee empowerment and its importance in providing good customer service.
22.06	Explain the role of communicating in customer service.
22.07	Determine strategies for working with various customer behaviors.
23.0	Perform selling techniques for e-Business. – The student will be able to:
23.01	Describe the relationship of personal selling to market-driven economies.
23.02	Identify career opportunities in the field of selling.
23.03	Explain the importance of relationship skills in personal selling.
23.04	Explain the importance of projecting a positive self-image.
23.05	Discuss communication-style bias and how it influences the relationship process.
23.06	Identify reasons why salespeople and customers benefit from thorough product knowledge.

23.07 List major sources of product information.
23.08 Discuss the evolving role of strategic selling.
23.09 Discuss the factors that influence people to make buying decisions.
23.10 Explain how to plan a sales presentation.
23.11 List criterion for qualifying and organizing prospects.
23.12 List guidelines for effective demonstrations.
23.13 Outline general strategies for negotiating buyer resistance.
23.14 Describe the proper attitude to display toward closing the sale.
23.15 List guidelines for closing the sale.
23.16 Explain how customer service can stimulate repeat business and referrals.
23.17 Describe how to properly handle activities that are part of the customer service program.
23.18 Describe the functions of a sales manager.
23.19 Explain how to manage time wisely.
23.20 List factors that influence the ethical conduct of sales personnel.
23.21 List and describe the functions of telemarketing.

Additional Information

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the appropriate career and technical student organizations for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following industry certifications have been approved by the Florida State Board of Education for statewide articulation credit into this degree program.

Certified Internet Web (CIW) – E-Commerce Designer (PROSO003) – 3 credits
CompTIA Security+ (COMPT003) – 3 credits

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp .

Program Length

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The standard length of this program is 63 credit hours according to Rule 6A-14.030, F.A.C.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

E-Business Security Technical Certificate (0552120102) – 24 credit hours
E-Business Software Technical Certificate (0552120103) – 21 credit hours
E-Business Technical Certificate (0552120101) – 24 credit hours
E-Business Technology Technical Certificate (0552120104) – 21 credit hours
E-Business Ventures Technical Certificate (0552120105) – 24 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Business Intelligence Specialist (60)**
Career Cluster: **Information Technology**

AS	
CIP Number	1552130101
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Others
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to in-depth instruction on the activities performed during the life cycle of business intelligence analysis; factors, issues, and constraints relating to the creation of business intelligence reports; requirements for documenting specifications; identifying data sources and retrieval issues and methodologies; report delivery mechanisms; report modification and maintenance; data governance; quality control tests; data and report integrity; and the use of business intelligence tools.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Describe the life cycle of business intelligence analysis.
02.0 Describe business intelligence analysis.
03.0 Describe the implications of business intelligence analysis on an organization's strategic marketing, organizational, and business plans.
04.0 Document specifications for and generate standard or custom reports, that summarize business, financial, or economic data for review by executives, managers, clients, and other stakeholders.
05.0 Define and differentiate among data constraints, filters, exception threshold, and data organization factors important in the creation of a report.
06.0 Locate, acquire, and model the data for analysis and output.
07.0 Compare and contrast the various forms for report presentation.
08.0 Describe the advantages and disadvantages for various report delivery mechanisms.
09.0 Reassess current business intelligence or trend data in support of altered information needs.
10.0 Analyze technology trends to identify markets for future product development or to improve sales of existing products.
11.0 Conduct or coordinate tests to ensure that intelligence is consistent with defined needs.
12.0 Formulate and/or adhere to data governance policies and processes.
13.0 Identify and analyze industry or geographic trends with business strategy implications.
14.0 Adhere to best practices for change management to ensure data and report integrity and continuity.
15.0 Apply quality control standards and measures.
16.0 Compare and contrast the attributes and appropriateness of business intelligence tools.

Florida Department of Education
Student Performance Standards

Program Title: **Business Intelligence Specialist**
CIP Number: **1552130101**
Program Length: **60 credit hours**
SOC Code(s): **15-1199**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:
01.0 Describe the life cycle of business intelligence analysis. – The student will be able to:
01.01 Describe the activities and goals of the analysis planning and justification phase.
01.01.1 Define the goals of the desired analysis.
01.01.2 Select appropriate analysis strategy according to key performance indicators.
01.01.3 Determine data parameters and metrics.
01.01.4 Determine data requirements.
01.02 Describe the activities and goals of the design phase.
01.02.1 Determine appropriate reporting format.
01.02.2 Determine appropriate delivery mechanism.
01.02.3 Define data criteria and constraints.
01.02.4 Delineate report data definitions.
01.02.5 Select appropriate reporting tool/form.
01.03 Describe the activities and goals of the development phase.
01.03.1 Identify available data sources and formats.
01.03.2 Acquire data.
01.03.3 Create report.
01.04 Describe the activities and goals of the evaluation phase.

		01.04.1	Define analytics/metrics suitable for evaluating accuracy and validity of results.
		01.04.2	Evaluate report output to assess whether intelligence is consistent with define goals.
		01.04.3	Assess report performance and usability.
	01.05	Describe the activities and goals of the deployment and maintenance phase.	
		01.05.1	Perform data reconciliation.
		01.05.2	Conduct periodic validation of reports with appropriate audiences and end-users.
		01.05.3	Track daily/weekly/monthly usage of data/reports.
		01.05.4	Determine proper “phasing out” thresholds for existing reports based on usage, data validity, and report reliability.
		01.05.5	Determine proper data archiving thresholds.
02.0	Describe business intelligence analysis. – The student will be able to:		
	02.01	Define the role of business intelligence analysis in the decision-making process.	
	02.02	Describe the categories of business intelligence reports.	
	02.03	Describe the sources of data and information used in the creation of business intelligence reports.	
	02.04	Explain the role and significance of OLAP, analytics, and data mining to the conduct of business intelligence analysis.	
	02.05	Describe risks/pitfalls associated with business intelligence analysis (e.g., data validity, integrity, inappropriate analytics/metrics).	
03.0	Describe the implications of business intelligence analysis on an organization’s strategic marketing, organizational, and business plans. – The student will be able to:		
	03.01	Explain how business intelligence is used in creating, validating, and strengthening an organization’s strategic marketing plan.	
	03.02	Explain how an organization’s internal processes, infrastructure, processes, and communication are impacted by the deployment of business intelligence.	
	03.03	Explain how business intelligence is used to facilitate an organization’s decision-making process.	
04.0	Document specifications for and generate standard or custom reports, that summarize business, financial, or economic data for review by executives, managers, clients, and other stakeholders. – The student will be able to:		
	04.01	Compare attributes and benefits of available data sources.	
		04.01.1	RDMS.
		04.01.2	OLAP Cubes.

04.01.3	Spreadsheet.
04.01.4	XML.
04.01.5	CSV.
04.01.6	Web service.
04.02	Define report data elements/requirements (metadata).
04.02.1	Dimensions.
04.02.2	Type I (As is – current).
04.02.3	Type II (Historical – slowly changing).
04.02.4	Facts.
04.02.5	Base.
04.02.6	Summaries.
04.02.7	Calculated fields.
04.02.8	Periodicity.
04.02.9	Relationships/JOINs.
04.03	Describe how data is to be used and retained (disposition).
04.03.1	Data mining.
04.03.2	Filtering.
04.03.3	Exception threshold alerts.
04.03.4	Aggregating.
04.03.5	Snapshot.
04.03.6	Dynamic.
04.03.7	Historical/archive/disposal.
04.04	Determine the form of analysis.
04.04.1	Comparative analysis.

	04.04.2	Impact analysis.
	04.04.3	Correlational (affinity) analysis.
	04.04.4	Trending/Forecasting.
05.0	Define and differentiate among data constraints, filters, exception threshold, and data organization factors important in the creation of a report. – The student will be able to:	
05.01	Distinguish between data constraints and filters and their appropriate use.	
05.02	Describe how each of the following data constraints relates to the creation and/or delivery of a report.	
	05.02.1	Size of recordset (scope & performance).
	05.02.2	Time/period (end points and span).
	05.02.3	Range (e.g., # of records).
	05.02.4	Data element (e.g., type, size).
	05.02.5	Localization (programming & display language).
05.03	Describe how each of the following types of filters may be used to refine or enhance a report.	
	05.03.1	Dimensions (Type I and Type II).
	05.03.2	Facts (e.g., base, summaries, calculated fields).
05.04	Illustrate how the use of an exception threshold contributes to the operational effectiveness of a report.	
	05.04.1	Display or action dependent on threshold.
	05.04.2	Triggers alert or advance warning of approaching static threshold.
	05.04.3	Highlights results exceeding dynamic threshold.
05.05	Compare and contrast the following forms of data organization in terms of representation and analysis of data results.	
	05.05.1	GROUP BY.
	05.05.2	ORDER BY (SORT).
	05.05.3	Concatenation/substring.
	05.05.4	KRAN.

06.0	Locate, acquire, and model the data for analysis and output. – The student will be able to:	
	06.01	Identify the types of data that might be used to create business intelligence reports in support of the organization's business and financial strategic goals.
		06.01.1 Inventory repositories.
		06.01.2 Sales data.
		06.01.3 Customer data.
		06.01.4 Employee/staffing data.
		06.01.5 Financial data.
	06.02	Describe the risks and potential areas of concern related to the use of external data.
		06.02.1 Integrity/validity of data.
		06.02.2 Legality of data availability.
		06.02.3 Privacy issues of data acquired.
		06.02.4 Confidentiality of acquisition.
	06.03	Describe potential issues, concerns, and obstacles associated with the use of data sources.
		06.03.1 Data form.
		06.03.2 Data integrity.
		06.03.3 Normalization.
	06.04	Describe the role and implications of standardization relative to internal and external data sources.
		06.04.1 Describe the need for data typing and transformation.
		06.04.2 Describe the methods by which transformation may be accomplished.
07.0	Compare and contrast the various forms for report presentation. – The student will be able to:	
	07.01	Describe the attributes of a report suitable for creation using a report generator.
	07.02	Describe the attributes of a report suitable for presentation in spreadsheet form.
	07.03	Describe the attributes of a report suitable for presentation in database form.
	07.04	Describe the attributes of a report suitable for presentation in OLAP Cube or hypercube form.

	07.05 Describe the attributes of a report suitable for presentation in HTML/Flash.
	07.06 Describe the attributes of a report suitable for presentation in graph form.
	07.07 Describe the attributes of a report suitable for presentation via a dashboard interface.
08.0	Describe the advantages and disadvantages for various report delivery mechanisms. – The student will be able to:
	08.01 Email.
	08.02 Web-based.
	08.03 Mobile device.
	08.04 Intranet.
	08.05 Print/PDF.
	08.06 Oral presentation.
09.0	Reassess current business intelligence or trend data in support of altered information needs. – The student will be able to:
	09.01 Identify and relate report design constraints and their relationship to data.
	09.02 Evaluate current technology in terms of compatibility and capacity for meeting new or evolving information needs.
	09.03 Re-construct report based on alternative parameters.
	09.04 Adapt and validate report based on new requirements.
10.0	Analyze technology trends to identify markets for future product development or to improve sales of existing products. – The student will be able to:
	10.01 Evaluate new technologies and products for applicability, capability, and capacity for current and future information needs.
	10.02 Create a proposal for introducing new, or adapting existing, business intelligence technology, including pricing, benefits summary, cost/benefit analysis, life cycle implications, and implementation plan.
11.0	Conduct or coordinate tests to ensure that intelligence is consistent with defined needs. – The student will be able to:
	11.01 Evaluate that reports meet requirements.
	11.02 Test metrics for accuracy and validity.
	11.03 Peer review.
	11.04 Use performance testing.
	11.05 Use performance tuning.

12.0	Formulate and/or adhere to data governance policies and processes. – The student will be able to:
12.01	Understand how information is disseminated to end-users.
12.02	Adhere to policies, tool use, and processes related to data governance.
13.0	Identify and analyze industry or geographic trends with business strategy implications. – The student will be able to:
13.01	Compare and contrast key performance indicators appropriate to the industry.
13.02	Define metrics to support analysis of targeted KPIs.
13.03	Understand how the monitoring and analysis of key performance indicators strengthen or support the organization's goals and strategies.
14.0	Adhere to best practices for change management to ensure data and report integrity and continuity. – The student will be able to:
14.01	Authorize/permissions schema.
14.02	Use internal controls.
14.03	Impact analysis.
14.04	Use Redundancy/archival policy.
14.05	Assess readiness for change.
14.06	Communicate changes.
14.07	Separate duties (e.g., design, implementation, testing).
15.0	Apply quality control standards and measures. – The student will be able to:
15.01	Check data quality.
15.02	Report quality.
15.03	Analytic/metric quality.
15.04	Check quality assurance.
16.0	Compare and contrast the attributes and appropriateness of business intelligence tools. – The student will be able to:
16.01	Compare and contrast enterprise-based/integrated business intelligence tools, including SAS, SAP, and COGNOS.
16.02	Compare and contrast native/client-based tools used in business intelligence analysis, including spreadsheets and SQL-compliant applications.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Business Computer Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	B070320
CIP Number	0511020202
Grade Level	30, 31
Standard Length	1200 hours
Teacher Certification	BUS ED 1 @2 VOE @7 TC COOP ED @7 BUS DP @7 %G TEC ELEC $7 G ELECT DP @7 %G BOOKKEEPIN @4 @7 G COMPU SCI 6
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the

Information Technology career cluster. This program offers a broad foundation of knowledge and skills to prepare students for employment in computer programming positions.

The content includes but is not limited to converting problems into detailed plans; writing code into computer language; testing, monitoring, debugging, documenting, and maintaining computer programs; and designing programs for specific uses and machines.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of five occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	CTS0041	Computer Programmer Assistant	300 hours	15-1131
C	CTS0042	Junior Programmer	300 hours	15-1131
D	CTS0043	Junior Programmer II	300 hours	15-1131
E	CTS0044	Computer Programmer	150 hours	15-1131

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
16.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
17.0 Distinguish between iterative and non-iterative program control structures.
18.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
19.0 Describe the processes, methods, and conventions for software development and maintenance.
20.0 Explain the types, uses, and limitations of testing for ensuring quality control.
21.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
22.0 Describe information security risks, threats, and strategies associated with software development.
23.0 Design a computer program to meet specific physical, operational, and interaction criteria.
24.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
25.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
26.0 Create a unit test plan, implement the plan, and report the results of testing.
27.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
28.0 Solve problems using critical thinking skills, creativity and innovation.
29.0 Use information technology tools.
30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
31.0 Describe the importance of professional ethics and legal responsibilities.

32.0 Participate in work-based learning experiences.
33.0 Identify functions of information processing.
34.0 Identify functions of computers.
35.0 Test programs.
36.0 Plan program design.
37.0 Code programs.
38.0 Perform program maintenance.
39.0 Evaluate assigned business computer programming tasks.
40.0 Develop an awareness of software quality assurance.
41.0 Implement enhanced program structures.
42.0 Develop an understanding of programming techniques and concepts.
43.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
44.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
45.0 Explain the importance of employability skill and entrepreneurship skills.
46.0 Test programs.
47.0 Plan program design.
48.0 Code programs.
49.0 Perform program maintenance.
50.0 Create and maintain documentation.
51.0 Evaluate assigned business computer programming tasks.
52.0 Demonstrate an understanding of operating systems, environments, and platforms.
53.0 Develop an awareness of software quality assurance.
54.0 Implement enhanced program structures.
55.0 Develop an understanding of programming techniques and concepts.
56.0 Test programs.
57.0 Plan program design.
58.0 Code programs.
59.0 Perform program maintenance.
60.0 Implement enhanced program structures.

Florida Department of Education
Student Performance Standards

Program Title: **Business Computer Programming**
PSAV Number: **B070320**

Course Number: OTA0040
Occupational Completion Point: A
Information Technology Assistant – 150 Hours – SOC Code 15-1151

Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
15.0	Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:
	15.01 Describe the evolution of programming and programming careers.
	15.02 Identify tasks performed by programmers.
	15.03 Describe how businesses use computer programming to solve business problems.
	15.04 Investigate job opportunities in the programming field.
	15.05 Explain different specializations and the related training in the computer programming field.
	15.06 Explain the need for continuing education and training of computer programmers.
	15.07 Explain enterprise software systems and how they impact business.
	15.08 Describe ethical responsibilities of computer programmers.
	15.09 Describe the role of customer support to software program quality.
	15.10 Identify credentials and certifications that may improve employability for a computer programmer.
	15.11 Identify devices, tools, and other environments for which programmers may develop software.
16.0	Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:
	16.01 Identify the characteristics (*e.g.*, size, limits) and uses of different numerical and non-numerical data types.
	16.02 Explain the types and uses of variables in programs.
	16.03 Determine the best data type to use for given programming problems.
	16.04 Identify the types of operations that can be performed on different data types.
	16.05 Evaluate arithmetic and logical expressions using appropriate operator precedence.
	16.06 Explain how computers store different data types in memory.
	16.07 Demonstrate the difference between "data" and "information."
	16.08 Use different number systems to represent data.
	16.09 Explain how national and international standards (*i.e.*, ASCII, UNICODE) are used to represent non-numerical data.
	16.10 Use Boolean logic to perform logical operations.

17.0	Distinguish between iterative and non-iterative program control structures. – The student will be able to:
17.01	Explain non-iterative programming structures (*e.g.*, if, if/else) and their uses.
17.02	Explain iterative programming structures (*e.g.*, while, do/while) and their uses.
18.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:
18.01	Identify the characteristics, uses, and limits of low-level programming languages.
18.02	Identify the characteristics, uses, and limits of high-level programming languages.
18.03	Identify the characteristics, uses, and limits of rapid development programming languages.
18.04	Describe object-oriented concepts.
18.05	Explain the characteristics of procedural and object-oriented programming languages.
18.06	Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).
19.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:
19.01	Describe and explain tools used in software development.
19.02	Describe the stages of the program life cycle.
19.03	Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).
19.04	List and explain the steps in the program development cycle.
19.05	Describe different types of documentation used in the program development cycle (*e.g.*, requirements document, program design documents, test plans).
19.06	Describe the on-going need for program maintenance.
19.07	Describe different methods companies use to facilitate program updates for enhancements and defects (*e.g.*, how customers receive patches, updates, new versions, upgrades).
19.08	Describe different methods used to facilitate version control and change management.
20.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:
20.01	Explain the uses and limits of testing in ensuring program quality.
20.02	Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).
20.03	Describe data and the use of test plans/scripts to be used in program testing.

20.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).
20.05	Identify the data to be used for boundary conditions.
20.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.
21.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:
21.01	Describe different design methodologies and their uses (*e.g.*, object-oriented design, structured design, rapid application development).
21.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).
21.03	Explain the role of existing libraries and packages in facilitating programmer productivity.
21.04	Participate and contribute to a design review of a program design developed using a common program design tool (*e.g.*, UML, flowcharts, design documents, pseudocode).
21.05	Write a program design document using UML or other standard design methodology.
21.06	Define input and output for a program module using UML or other standard design methodology.
22.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:
22.01	Explain the security risks to personal and business computer users.
22.02	Identify different types of threats to computer systems.
22.03	Identify methods to protect against different threats to computer systems.
22.04	Understand the importance of a disaster/emergency response plan.
22.05	Identify alternative methods for data storage and backup (*e.g.*, mirroring, fail-over, high availability, types of backups).
23.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:
23.01	Choose appropriate data types depending on the needs of the program.
23.02	Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).
23.03	Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).
23.04	Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).
23.05	Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).

24.0	Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:
24.01	Use appropriate naming conventions to define program variables and modules (methods, functions).
24.02	Use a program editor to write the source code for a program.
24.03	Write programs that use selection structures (*e.g.*, if, if/else).
24.04	Write programs that use repetition structures (*e.g.*, while, do/while).
24.05	Write programs that use nested structures.
24.06	Use internal documentation (*e.g.*, single-line and multi-line comments, program headers, module descriptions, and meaningful variable, function/module names) to document a program according to accepted standards.
24.07	Compile and run programs.
24.08	Write programs that use standard arithmetic operators with different numerical data types.
24.09	Write programs that use standard logic operators.
24.10	Write programs that use a variety of common data types.
24.11	Write programs that perform data conversion between standard data types.
24.12	Write programs that define, use, search, and sort arrays.
24.13	Write programs that use user-defined data types.
24.14	Demonstrate understanding and use of appropriate variable scope.
25.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:
25.01	Write programs that perform user input and output.
25.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).
25.03	Write program modules such as functions, subroutines, or methods.
25.04	Write program modules that accept arguments.
25.05	Write program modules that return values.
25.06	Write program modules that validate arguments and return error codes.
25.07	Write interactive programs.

	25.08 Write programs that use standard libraries to enhance program function.
	25.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
26.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	26.01 Write a unit test plan that identifies the input data and expected results for program tests.
	26.02 Test and debug programs, including programs written by others.
	26.03 Write a test report that identifies the results of testing.
	26.04 Trace through the function of a program to ensure valid operation.
	26.05 Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).
	26.06 Create a disaster/emergency response plan for a computer system.
27.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	27.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	27.02 Locate, organize and reference written information from various sources.
	27.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	27.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	27.05 Apply active listening skills to obtain and clarify information.
	27.06 Develop and interpret tables and charts to support written and oral communications.
	27.07 Exhibit public relations skills that aid in achieving customer satisfaction.
28.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	28.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	28.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	28.03 Identify and document workplace performance goals and monitor progress toward those goals.
	28.04 Conduct technical research to gather information necessary for decision-making.
29.0	Use information technology tools. – The student will be able to:
	29.01 Use personal information management (PIM) applications to increase workplace efficiency.
	29.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.

	29.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	29.04 Employ collaborative/groupware applications to facilitate group work.
30.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	30.01 Employ leadership skills to accomplish organizational goals and objectives.
	30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	30.03 Conduct and participate in meetings to accomplish work tasks.
31.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	31.01 Evaluate and justify decisions based on ethical reasoning.
	31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.

Course Number: CTS0042 **Occupational Completion Point: C** **Junior Programmer – 300 Hours – SOC Code 15-1131**
32.0 Participate in work-based learning experiences. – The student will be able to:
32.01 Participate in work-based learning experiences in a computer programming environment.
32.02 Compare and contrast programming languages used in a computer programming environment.
32.03 Discuss the management/supervisory skills needed in a computer programming environment.
33.0 Identify functions of information processing. – The student will be able to:
33.01 Identify the advantages and disadvantages of blocking and buffering when accessing data on tape and disk storage.
33.02 Choose appropriate storage of numeric values to insure precision needed for calculations (e.g., integer, fixed-point, floating-point).
34.0 Identify functions of computers. – The student will be able to:
34.01 Identify the advantages and disadvantages of virtual memory.
35.0 Test programs. – The student will be able to:
35.01 Develop a plan for system integration testing.
36.0 Plan program design. – The student will be able to:
36.01 Plan interfaces for systems integration.
37.0 Code programs. – The student will be able to:
37.01 Access external files in a client/server environment.
38.0 Perform program maintenance. – The student will be able to:
38.01 Modify or create new programs for vendor supplied applications.
38.02 Use a computer system with current commercial-end application software to solve problems within an organizational environment.
39.0 Evaluate assigned business computer programming tasks. – The student will be able to:
39.01 Utilize and apply project and time management tools to control systems development.
39.02 Analyze computer resources necessary to run a program.

40.0	Develop an awareness of software quality assurance. – The student will be able to:
	40.01 Evaluate performance, functionality, and validity of various software packages.
41.0	Implement enhanced program structures. – The student will be able to:
	41.01 Write programs to import/export data from external sources.
	41.02 Write routines that incorporate “help” text.
	41.03 Write interactive programs.
	41.04 Design screen layouts for use in interactive programs.
42.0	Develop an understanding of programming techniques and concepts. – The student will be able to:
	42.01 Identify object-oriented concepts and provide examples of objects in an object-oriented language.
	42.02 Describe development methodologies, programming and system languages, database technologies, and data communication.
43.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	43.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	43.02 Explain emergency procedures to follow in response to workplace accidents.
	43.03 Create a disaster and/or emergency response plan.
44.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	44.01 Employ leadership skills to accomplish organizational goals and objectives.
	44.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	44.03 Conduct and participate in meetings to accomplish work tasks.
	44.04 Employ mentoring skills to inspire and teach others.
45.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	45.01 Identify and demonstrate positive work behaviors needed to be employable.
	45.02 Develop personal career plan that includes goals, objectives, and strategies.
	45.03 Examine licensing, certification, and industry credentialing requirements.
	45.04 Maintain a career portfolio to document knowledge, skills, and experience.

45.05	Evaluate and compare employment opportunities that match career goals.
45.06	Identify and exhibit traits for retaining employment.
45.07	Identify opportunities and research requirements for career advancement.
45.08	Research the benefits of ongoing professional development.
45.09	Examine and describe entrepreneurship opportunities as a career planning option.

Course Number: CTS0043 **Occupational Completion Point: D** **Junior Programmer II – 300 Hours – SOC Code 15-1131**
46.0 Test programs. – The student will be able to:
46.01 Develop a plan for testing programs.
46.02 Develop a plan for system integration testing.
46.03 Develop data for use in program testing.
46.04 Perform debugging activities.
46.05 Distinguish among the different types of program and design errors.
46.06 Evaluate program test results.
46.07 Execute programs and subroutines as they relate to the total application.
46.08 Use trace routines of compilers to assist in program debugging.
46.09 Compile and run programs.
47.0 Plan program design. – The student will be able to:
47.01 Formulate a plan to determine program specifications individually or in groups.
47.02 Use a graphical representation or pseudo code to represent the structure in a program or subroutine.
47.03 Design programs to solve problems using problem-solving strategies.
47.04 Prepare proper input/output layout specifications.
47.05 Examine existing utility programs and subroutines for use with other programs.
47.06 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
48.0 Code programs. – The student will be able to:
48.01 Utilize reference manuals.
48.02 Write programs according to recognized programming standards.
48.03 Write internal documentation statements as needed in the program source code.
48.04 Code programs in high-level languages for business applications.

	48.05 Write code that accesses sequential, indexed sequential, random, and direct files.
	48.06 Code programs using logical statements (e.g., If-Then-Else, Do...While).
	48.07 Enter and modify source code using a program language editor.
	48.08 Code routines within programs that validate input data.
	48.09 Use the rounding function in calculations within programs.
49.0	Perform program maintenance. –The student will be able to:
	49.01 Review requested modification of programs and establish a plan of action.
	49.02 Design needed modifications in conformance with established standards.
	49.03 Code, test, and debug modifications prior to updating production code.
	49.04 Update production programs and documentation with changes.
	49.05 Analyze output to identify and annotate errors or enhancements.
	49.06 Modify or create new programs for vendor supplied applications.
	49.07 Use a computer system with current commercial-end application software to solve problems within an organizational environment.
50.0	Create and maintain documentation. – The student will be able to:
	50.01 Write documentation to assist operators and end-users.
	50.02 Follow established documentation standards.
	50.03 Update existing documentation to reflect program changes.
51.0	Evaluate assigned business computer programming tasks–The student will be able to:
	51.01 Utilize and apply project and time management tools to control systems development.
	51.02 Analyze computer resources necessary to run a program.
52.0	Demonstrate an understanding of operating systems, environments, and platforms. – The student will be able to:
	52.01 Assess and analyze the functions of different operating systems.
	52.02 Assess and analyze the program development and execution utilities of relevant operating systems.

53.0	Develop an awareness of software quality assurance. – The student will be able to:
	53.01 Evaluate performance, functionality, and validity of various software packages.
54.0	Implement enhanced program structures. – The student will be able to:
	54.01 Write programs that incorporate multi-level subtotals and page breaks.
	54.02 Write programs that include tables or arrays and routines for data entry and lookup.
	54.03 Write routines to sort arrays.
	54.04 Write programs that sort records in files.
	54.05 Write programs to create and maintain a master file.
	54.06 Write programs to process transactions.
	54.07 Write programs to import/export/convert data from external sources.
	54.08 Write programs that use iteration.
	54.09 Write routines that incorporate “help” text.
	54.10 Write programs that read and write sequential files.
	54.11 Write programs that read and write indexed-sequential files.
	54.12 Write programs that read and write random files.
	54.13 Write interactive programs.
	54.14 Design screen layouts for use in interactive programs.
	54.15 Write programs using object-oriented languages.
55.0	Develop an understanding of programming techniques and concepts. – The student will be able to:
	55.01 Describe development methodologies, programming and system languages, database technologies, and data communication.

Course Number: CTS0044 **Occupational Completion Point: E** **Computer Programmer – 150 Hours – SOC Code 15-1131**
56.0 Test programs. – The student will be able to:
56.01 Develop a plan for testing programs.
56.02 Develop a plan for system integration testing.
56.03 Develop data for use in program testing.
56.04 Perform debugging activities.
56.05 Distinguish among the different types of program and design errors.
56.06 Evaluate program test results.
56.07 Execute programs and subroutines as they relate to the total application.
56.08 Use trace routines of compilers to assist in program debugging.
57.0 Plan program design. – The student will be able to:
57.01 Formulate a plan to determine program specifications individually or in groups.
57.02 Use a graphical representation or pseudo code to represent the structure in a program or subroutine.
57.03 Design programs to solve problems using problem-solving strategies.
57.04 Prepare proper input/output layout specifications.
57.05 Examine existing utility programs and subroutines for use with other programs.
57.06 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
58.0 Code programs. – The student will be able to:
58.01 Utilize reference manuals.
58.02 Write programs according to recognized programming standards.
58.03 Write internal documentation statements as needed in the program source code.
58.04 Code programs in high-level languages for business applications.
58.05 Write code that accesses sequential, indexed sequential, random, and direct files.

	58.06 Code programs using logical statements (e.g., If-Then-Else, Do-While).
	58.07 Enter and modify source code using a program language editor.
	58.08 Code routines within programs that validate input data.
	58.09 Use the rounding function in calculations within programs.
59.0	Perform program maintenance. – The student will be able to:
	59.01 Review requested modification of programs and establish a plan of action.
	59.02 Design needed modifications in conformance with established standards.
	59.03 Code, test, and debug modifications prior to updating production code.
	59.04 Update production programs and documentation with changes.
	59.05 Analyze output to identify and annotate errors or enhancements.
60.0	Implement enhanced program structures. – The student will be able to:
	60.01 Write programs that include tables or arrays and routines for data entry and lookup.
	60.02 Write programs that use iteration.
	60.03 Write routines that incorporate “help” text.
	60.04 Write programs that read and write sequential files.
	60.05 Write programs that read and write indexed-sequential files.
	60.06 Write programs that read and write random files.
	60.07 Write interactive programs.
	60.08 Design screen layouts for use in interactive programs.
	60.09 Write programs using object-oriented languages.
	60.10 Write programs that include data structures (e.g., stacks, queues, trees, linked lists).
	60.11 Write programs that are event-driven.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Support Services**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	B078000
CIP Number	0511090102
Grade Level	30, 31
Standard Length	1050 hours
Teacher Certification	BUS ED 1 @2 VOE @7 TC COOP ED @7 BUS DP @7 %G ELECT DP @7 %G BOOKKEEPIN @4 7 G CLERICAL @7 7G SECRETAR 7G TEC ELEC $7 COMPU SCI 6 COMP SVC 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1142 – Network and Computer Systems Administrators 15-1143 – Computer Network Architects
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in network support services positions in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster. This program offers a broad foundation of knowledge and skills to prepare students for employment.

The content includes but is not limited to to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of seven occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	EEV0504	Computer Support Assistant	150 hours	15-1151
C	CTS0022	Network Support Help Desk Assistant	150 hours	15-1142
D	CTS0023	Network Support Administrator	150 hours	15-1142
E	CTS0024	Senior Network Administrator	150 hours	15-1143
F	CTS0029	Wireless Network Administrator	150 hours	15-1143
G	EEV0317	Data Communications Analyst	150 hours	15-1143

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
16.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules.
17.0 Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment.
18.0 Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
19.0 Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems.
20.0 Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems.
21.0 Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked.
22.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
23.0 Demonstrate proficiency using graphical user interface (GUI) operating systems.
24.0 Demonstrate language arts knowledge and skills.

25.0 Demonstrate mathematics knowledge and skills.
26.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
27.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
28.0 Understand, describe, and explain internet connections.
29.0 Define networking terminology.
30.0 Explain how to connect copper media, optical media, and wireless media.
31.0 Perform tasks related to the network cable testing and cable making.
32.0 Define network topologies, devices and connections.
33.0 Define Ethernet fundamentals and operations.
34.0 Define and explain the functions of bridges and switches.
35.0 Explain the mathematical concepts and protocols behind the internet.
36.0 Define and explain the difference between routed and routing protocols.
37.0 Recognize, define, and explain functions of the transport layer.
38.0 Explain, define, and identify the components of a WAN and router.
39.0 Describe and identify an operating system for a router.
40.0 Explain how to establish connections between neighboring routers.
41.0 Identify and explain the router boot sequence and file system.
42.0 Identify and explain static and dynamic routing protocols.
43.0 Describe and configure distance vector protocols.
44.0 Perform tasks related to protocol troubleshooting.
45.0 Examine and test networks.
46.0 Define, explain and describe access lists.
47.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
48.0 Solve problems using critical thinking skills, creativity and innovation.
49.0 Use information technology tools.
50.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
51.0 Describe the importance of professional ethics and legal responsibilities
52.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. Participate in work-based learning experiences.
53.0 Participate in work-based learning experiences.
54.0 Provide network support and assistance by troubleshooting and diagnosing through direct contact remote access.
55.0 Develop electronic communications skills.
56.0 Perform logical and physical network design activities.
57.0 Demonstrate proficiency in selecting appropriate various routing protocols and IP routing configuration for various network designs.
58.0 Demonstrate proficiency in using network traffic filtering to improve network performance and provide basic levels of security.
59.0 Perform network management activities related to documentation, security, performance, administration, troubleshooting and coping with environmental factors.
60.0 Identify and describe various van functions, devices, and demonstrate understanding of the wan design process.
61.0 Describe the operation and implementation of virtual private networks.
62.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.

63.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
64.0 Explain the importance of employability skill and entrepreneurship skills.
65.0 Demonstrate personal money-management concepts, procedures, and strategies.
66.0 Participate in work-based learning experiences.
67.0 Compare and contrast hierarchical network design models and scalable internetworks.
68.0 Discuss advanced IP addressing management.
69.0 Demonstrate proficiency in basic router configuration.
70.0 Demonstrate proficiency in the use of OSPF.
71.0 Understand and discuss multi-area OSPF operation and configuration.
72.0 Demonstrate the use of stub and totally stubby areas.
73.0 Configure and define virtual links.
74.0 Demonstrate proficiency in the use of EIGRP.
75.0 Demonstrate proficiency in route optimization.
76.0 Demonstrate proficiency in the use of BGP.
77.0 Define and show proficiency in security.
78.0 Use lab equipment, demonstrate the setup, configuration, connectivity of routers to create a small WAN.
79.0 Show the process of using modems and asynchronous dialup connections.
80.0 Configure and verify PPP configurations.
81.0 Configure and monitor ISDN and DDR.
82.0 Configure dialer profiles.
83.0 Demonstrate proficiency in the understanding of X.25 protocols.
84.0 Configure and troubleshoot frame relay.
85.0 Demonstrate the use of WAN backup and dial backup.
86.0 Demonstrate the use of queuing and compression techniques.
87.0 Demonstrate the use of scaling IP addresses with NAT.
88.0 Demonstrate proficiency using AAA to scale access control.
89.0 Discuss and explain emerging remote-access technologies.
90.0 Understand and describe key characteristics of various switching technologies, LAN switching and the hierarchical model of network design, and the building-block approach.
91.0 Understand and describe campus networks, design models, and switching technologies.
92.0 List and describe various types of LAN media.
93.0 Show proficiency configuring a switch.
94.0 Demonstrate proficiency configuring VLANS.
95.0 Understand and explain spanning tree protocol (STP) AND redundant links.
96.0 Demonstrate proficiency routing between VLANS.
97.0 Demonstrate proficiency with multilayer switching.
98.0 Demonstrate the use of hot standby routing protocol (HSRP).
99.0 Understand and use IGMP and multicasting.
100.0 Demonstrate proficiency restricting network access.
101.0 Demonstrate proficiency using network troubleshooting tools and basic network management diagnostic tools.
102.0 List and define the commonly used protocols, routing techniques, and switching processes.
103.0 Demonstrate proficiency troubleshooting TCP/IP, LAN switch environment, VLANS, frame relay, and ISDN.

104.0 Demonstrate proficiency troubleshooting EIGRP, OSPF, and BGP.
105.0 Participate in work-based learning experiences.
106.0 Demonstrate proficiency in applying radio frequency (RF) technologies.
107.0 Develop an awareness of wireless LAN technologies.
108.0 Perform implementation and management activities.
109.0 Develop an awareness of wireless security systems.
110.0 Demonstrate knowledge of wireless industry standards.
111.0 Participate in work-based learning experiences.
112.0 Demonstrate proficiency in applying radio frequency (RF) technologies.
113.0 Develop an awareness of wireless LAN technologies.
114.0 Perform implementation and management activities.
115.0 Develop an awareness of wireless security systems.
116.0 Demonstrate knowledge of wireless industry standards.

Florida Department of Education
Student Performance Standards

Program Title: Network Support Services
PSAV Number: B078000

Course Number: OTA0040
Occupational Completion Point: A
Information Technology Assistant – 150 Hours – SOC Code 15-1151

Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: EEV0504 **Occupational Completion Point: B** **Computer Support Assistant – 150 Hours – SOC Code 15-1151**	
15.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
15.01	Develop strategies for resolving customer conflicts.
16.0	Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules. – The student will be able to:
16.01	Identify and describe the functions of main processing boards (e.g., CPUs, RAM, ROM, bus architecture).
16.02	Identify and describe the functions of communication ports (e.g., serial and parallel ports).
16.03	Identify and describe the functions of peripheral devices (e.g., scanners, modems, hard drives, printers).
16.04	Identify and describe the components of portable systems (e.g., battery, LCD, AC adapter, PDAs).
16.05	Troubleshoot, install and upgrade computers and peripherals.
16.06	Perform system hardware setup Demonstrate an understanding of input/output devices.
16.07	Installation and configuration of applications software, hardware, and device drivers.
16.08	Demonstrate an understanding of the operation and purpose of hardware components.
16.09	Install operating system software.
16.10	Customize operating systems.
16.11	Install application software.
16.12	Perform storage formatting and preparation activities.
16.13	Identify data measurement (e.g., bits, bytes, kilobytes).
16.14	Install and Configure RAID.
16.15	Recognize and report on server room environmental issues (temperature, humidity/ESD/power surges, back-up).
17.0	Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment. – The student will be able to:
17.01	Troubleshoot a personal computer system.
17.02	Identify configuration problems.

	17.03 Identify software problems.
	17.04 Identify hardware malfunctions.
	17.05 Identify network malfunctions.
	17.06 Resolve computer error messages.
	17.07 Understand and troubleshoot memory and cache systems.
	17.08 Verify that drives are the appropriate type.
	17.09 Describe knowledge database search procedures used to identify possible solutions when troubleshooting software and hardware problems.
18.0	Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace. – The student will be able to:
	18.01 Apply basic rules for hardware safety.
	18.02 Demonstrate proficiency in basic preventative hardware maintenance.
	18.03 Special disposal procedures that comply with environmental guidelines for batteries, CRTs, toner kits/cartridges, chemical solvents and cans, and MSDS.
	18.04 Apply ergonomic principles applicable to the configuration of computer workstations.
	18.05 Describe ethical issues and problems associated with computers and information systems.
19.0	Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems. – The student will be able to:
	19.01 Identify EDO RAM, DRAM, SRAM, RIMM, VRAM, SDRAM, and WRAM.
	19.02 Identify memory banks, memory chips (8-bit, 16-bit, and 32-bit), SIMMS (Single In-line Memory Module), DIMMS (Dual In-line Memory Module), parity chips versus non-parity chips.
	19.03 Identify printer parallel port, COM/serial port, floppy drive, hard drive, Memory, and Boot sequence.
20.0	Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems. – The student will be able to:
	20.01 Identify types of printers—Laser, Inkjet, Dot Matrix.
	20.02 Identify care and service techniques and common problems with primary printer types.
	20.03 Implement and manage printing on a network.

21.0	Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked. – The student will be able to:
21.01	Define networking and describe the purpose of a network.
21.02	Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).
21.03	Describe the various types of network topologies.
21.04	Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.
21.05	Configure network and verify network connectivity.
21.06	Discuss the responsibilities of the network administrator (e.g., rights and responsibilities).
21.07	Develop user logon procedures.
21.08	Utilize network management infrastructures (e.g., network monitoring, alerting, security) to perform administrative tasks.
21.09	Identify common backup strategies and procedures.
21.10	Select and use appropriate electronic communications software and hardware for specific tasks.
21.11	Compare and contrast Internet software and protocols.
21.12	Diagnose and resolve electronic communications operational problems.
21.13	Design and implement directory tree structures.
21.14	Install services tools (SNMP, backup software).
21.15	Perform full backup and verify backup.
21.16	Identify bottlenecks (e.g., processor, bus transfer, I/O, disk I/O, network I/O, memory).
21.17	Use the concepts of fault tolerance/fault recovery to create a disaster recovery plan.
21.18	Document and test disaster recovery plan regularly, and update as needed.
22.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, internet, remote access, or direct contact. – The student will be able to:
22.01	Apply call center vocabulary.
22.02	Listen and input information simultaneously.
22.03	Apply first response assistance for minor repair work.

23.0	Demonstrate proficiency using graphical user interface (GUI) operating systems. – The student will be able to:
	23.01 Identify parts of GUI windows.
	23.02 Create and use icons.
	23.03 Demonstrate proficiency in using menu systems.
	23.04 Demonstrate proficiency in using pointing and selection devices.
	23.05 Identify keyboard shortcuts and special function keys.
	23.06 Demonstrate proficiency in manipulating windows.
	23.07 Utilize help systems and hypertext links.
	23.08 Create, organize, and maintain file system directories.
	23.09 Organize desktop objects.
	23.10 Run multiple applications.
24.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	24.01 Locate, comprehend and evaluate key elements of oral and written information.
	24.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	24.03 Present information formally and informally for specific purposes and audiences.
25.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	25.01 Demonstrate knowledge of arithmetic operations.
	25.02 Analyze and apply data and measurements to solve problems and interpret documents.
	25.03 Construct charts/tables/graphs using functions and data.

Course Number: CTS0022 **Occupational Completion Point: C** **Network Support Help Desk Assistant – 150 Hours – SOC Code 15-1142**	
26.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
26.01	Develop diplomatic methods to communicate with customers.
27.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, email, remote access, or direct contact. – The student will be able to:
27.01	Apply first response assistance for minor repair work.
28.0	Understand, describe, and explain internet connections. – The student will be able to:
28.01	Understand the physical connectivity necessary for a computer to connect to the Internet.
28.02	Recognize the primary components of a computer.
28.03	Install and troubleshoot network interface cards and/or modems.
28.04	Use basic testing procedures to test the Internet connection.
28.05	Demonstrate a basic understanding of the use of Web browsers and plug-ins.
29.0	Define networking terminology. – The student will be able to:
29.01	Explain the importance of bandwidth in networking.
29.02	Identify bps, kbps, Mbps, and Gbps as units of bandwidth.
29.03	Explain the difference between bandwidth and throughput.
29.04	Explain the development of the Open System Interconnection model (OSI).
29.05	List the advantages of a layered approach.
29.06	Identify each of the seven layers of the OSI model.
29.07	Identify the four layers of the TCP/IP model.
29.08	Describe the similarities and differences between the two models.
29.09	Briefly outline the history of networking.
29.10	Identify devices used in networking.

	29.11 Understand the role of protocols in networking.
	29.12 Define LAN, WAN, MAN, and SAN.
	29.13 Explain VPNs and their advantages.
	29.14 Describe the differences between intranets and extranets.
30.0	Explain how to connect copper media, optical media, and wireless media. – The student will be able to:
	30.01 Discuss the electrical properties of matter.
	30.02 Define voltage, resistance, impedance, current, and circuits.
	30.03 Describe the specifications and performances of different types of cable.
	30.04 Describe coaxial cable and its advantages and disadvantages over other types of cable.
	30.05 Describe shielded twisted-pair (STP) cable and unshielded twisted-pair cable and its uses.
	30.06 Describe (UTP) and their uses.
	30.07 Discuss the characteristics of straight-through, crossover, and rollover cables and where each is used.
	30.08 Explain the basics of fiber-optic cable.
	30.09 Describe how fibers can guide light for long distances.
	30.10 Describe multimode and single-mode fiber.
	30.11 Describe how fiber is installed.
	30.12 Describe the type of connectors and equipment used with fiber-optic cable.
	30.13 Explain how fiber is tested to ensure that it will function properly.
	30.14 Discuss safety issues dealing with fiber-optics.
31.0	Perform tasks related to the network cable testing and cable making. – The student will be able to:
	31.01 Differentiate between sine waves and square waves.
	31.02 Define and calculate exponents and logarithms.
	31.03 Define and calculate decibels.
	31.04 Define basic terminology related to time, frequency, and noise.

31.05	Differentiate between digital bandwidth and analog bandwidth.
31.06	Compare and contrast noise levels on various types of cabling.
31.07	Define and describe the effects of attenuation and impedance mismatch.
31.08	Define crosstalk, near-end crosstalk, far-end crosstalk, and power sum near-end crosstalk.
31.09	Describe how crosstalk and twisted pairs help reduce noise.
31.10	Describe the ten copper cable tests defined in TIA/EIA-568-B.
31.11	Describe the difference between Category 5 and Category 6 cable.
32.0	Define network topologies, devices and connections. – The student will be able to perform tasks related to the following:
32.01	Identify characteristics of Ethernet networks.
32.02	Identify straight-through, crossover, and rollover cable.
32.03	Describe the function, advantages, and disadvantages of repeaters, hubs, bridges, switches, and wireless network components.
32.04	Describe the function of peer-to-peer networks.
32.05	Describe the function, advantages, and disadvantages of client-server networks.
32.06	Describe and differentiate between serial, digital subscriber line (DSL), and cable modem WAN connections.
32.07	Identify router serial ports and their cable and connectors.
32.08	Identify and describe the placement of equipment used in various WAN configurations.
33.0	Define Ethernet fundamentals and operations. – The student will be able to:
33.01	Describe the basics of Ethernet technology.
33.02	Explain naming rules of Ethernet technology.
33.03	Define how Ethernet and the OSI model interact.
33.04	Describe the Ethernet framing process and frame structure.
33.05	List Ethernet frame field names and purposes.
33.06	Identify the characteristics of CSMA/CD.
33.07	Describe the key aspects of Ethernet timing, interframe spacing and backoff time after a collision.

	33.08 Define Ethernet errors and collisions.
	33.09 Explain the concept of auto-negotiation in relation to speed and duplex.
34.0	Define and explain the functions of bridges and switches. – The student will be able to:
	34.01 Define bridging and switching.
	34.02 Define and describe the content-addressable memory (CAM) table.
	34.03 Define latency.
	34.04 Describe store-and forward and cut-through switching modes.
	34.05 Explain Spanning-Tree Protocol (STP).
	34.06 Define collisions, broadcasts, collision domains, and broadcast domains.
	34.07 Identify the Layer 1, 2, and 3 devices used to create collision domains and broadcast domains.
	34.08 Discuss data flow and problems with broadcasts.
	34.09 Explain network segmentation and list the devices used to create segments.
35.0	Explain the mathematical concepts and protocols behind the internet. – The student will be able to:
	35.01 Explain why the Internet was developed and how TCP/IP fits the design of the Internet.
	35.02 List the four layers of the TCP/IP model.
	35.03 Describe the functions of each layer of the TCP/IP model.
	35.04 Compare the OSI model and the TCP/IP model.
	35.05 Describe the function and structure of IP addresses.
	35.06 Understand why subnetting is necessary.
	35.07 Explain the difference between public and private addressing.
	35.08 Understand the function of reserved IP addresses.
	35.09 Explain the use of static and dynamic addressing for a device.
	35.10 Use ARP to obtain the MAC address to send a packet to another device.
	35.11 Understand the issues related to addressing between networks.

36.0	Define and explain the difference between routed and routing protocols. – The student will be able to:
36.01	Describe routed (routable) protocols.
36.02	List the steps of data encapsulation in an internetwork as data is routed to one or more Layer 3 devices.
36.03	Describe connectionless and connection-oriented delivery.
36.04	Name the IP packet fields.
36.05	Describe process of routing.
36.06	Compare and contrast different types of routing protocols.
36.07	List and describe several metrics used by routing protocols.
36.08	List several uses for subnetting.
36.09	Determine the subnet mask for a given situation.
36.10	Use a subnet mask to determine the subnet ID.
37.0	Recognize, define, and explain functions of the transport layer. – The student will be able to:
37.01	Describe the functions of the TCP/IP transport layer.
37.02	Describe flow control.
37.03	Describe the processes of establishing a connection between peer systems.
37.04	Describe windowing.
37.05	Describe acknowledgment.
37.06	Identify and describe transport layer protocols.
37.07	Describe TCP and UDP header formats.
37.08	Describe TCP and UDP port numbers and ports used for services and clients.
37.09	List the major protocols of the TCP/IP application layer.
37.10	Provide a brief description of the features and operation of well-known TCP/IP applications.
37.11	Describe TCP and UDP with its function.
37.12	Describe TCP synchronization and flow control.

	37.13 Describe multiple conversations between hosts.
	37.14 Understand the differences and the relationship between MAC addresses, IP addresses, and port numbers.
38.0	Explain, define, and identify the components of a WAN and router. – The student will be able to:
	38.01 Identify organizations responsible for WAN standards.
	38.02 Explain the difference between a WAN and LAN and the type of addresses each uses.
	38.03 Describe the role of a router in a WAN.
	38.04 Identify internal components of the router and describe their functions.
	38.05 Describe the physical characteristics of the router.
	38.06 Identify common ports on a router.
	38.07 Properly connect FastEthernet, serial WAN, and console ports.
39.0	Describe and identify an operating system for a router. – The student will be able to:
	39.01 Describe the purpose of the IOS.
	39.02 Describe the basic operation of the IOS.
	39.03 Identify various IOS features.
	39.04 Identify the methods to establish a CLI session with the router.
	39.05 Move between the user EXEC and privileged EXEC modes.
	39.06 Establish a HyperTerminal session on a router.
	39.07 Log into a router.
	39.08 Use the help feature in the command line interface.
	39.09 Troubleshoot command errors.
	39.10 Name a router.
	39.11 Set passwords.
	39.12 Examine show commands.
	39.13 Configure a serial interface.

	39.14 Configure an Ethernet interface.
	39.15 Execute changes to a router.
	39.16 Save changes to a router.
	39.17 Configure an interface description.
	39.18 Configure a message-of-the-day banner.
	39.19 Configure host tables.
	39.20 Understand the importance of backups and documentation.
40.0	Explain how to establish connections between neighboring routers. – The student will be able to:
	40.01 Enable and disable protocols.
	40.02 Determine which neighboring devices are connected to which local interfaces.
	40.03 Gather network address information about neighboring devices using CDP.
	40.04 Establish, Verify, Disconnect, Suspend a Telnet connection.
	40.05 Perform alternative connectivity tests.
	40.06 Troubleshoot remote terminal connections.
41.0	Identify and explain the router boot sequence and file system. – The student will be able to:
	41.01 Identify the stages of the router boot sequence.
	41.02 Determine how a router locates and loads its operating system.
	41.03 Use the boot system command.
	41.04 Identify the configuration register values.
	41.05 Briefly describe the files used by the Router IOS and their functions.
	41.06 List the locations on the router of the different file types.
	41.07 Briefly describe the parts of the IOS name.
	41.08 Save and restore configuration files using TFTP and copy-and paste.
	41.09 Load an IOS image using TFTP.
	41.10 Verify the file system using show commands.

42.0	Identify and explain static and dynamic routing protocols. – The student will be able to:
	42.01 Explain the significance of static routing.
	42.02 Configure static and default routes.
	42.03 Verify and troubleshoot static and default routes.
	42.04 Identify the classes of routing protocols.
	42.05 Identify distance vector routing protocols.
	42.06 Identify link-state routing protocols.
	42.07 Describe the basic characteristics of common routing protocols.
	42.08 Identify interior gateway protocols.
	42.09 Identify exterior gateway protocols.
	42.10 Enable Routing Information Protocol (RIP) on a router.
43.0	Describe and configure distance vector protocols. – The student will be able to:
	43.01 Describe how routing loops can occur in distance vector routing.
	43.02 Describe several methods used by distance vector routing protocols to ensure that routing information is accurate.
	43.03 Configure RIP.
	43.04 Use the IP classless command.
	43.05 Troubleshoot RIP.
	43.06 Configure RIP for load balancing.
	43.07 Configure static routes for RIP.
	43.08 Verify RIP.
	43.09 Configure EIGRP.
	43.10 Verify EIGRP operation.
	43.11 Troubleshoot EIGRP.

44.0	Perform tasks related to protocol troubleshooting. – The student will be able to:
	44.01 Describe ICMP.
	44.02 Describe the ICMP message format and error message types.
	44.03 Identify potential causes of specific ICMP error messages.
	44.04 Describe ICMP control messages.
	44.05 Identify a variety of ICMP control messages used in networks today.
	44.06 Determine the causes for ICMP control messages.
45.0	Examine and test networks. – The student will be able to:
	45.01 Use the commands to gather detailed information about the routes installed on the router.
	45.02 Configure a default route or default network.
	45.03 Understand how a router uses both Layer 2 and Layer addressing to move data through the network.
	45.04 Use commands to the router at different OSI layers.
46.0	Define, explain and describe access lists. – The student will be able to:
	46.01 Describe the differences between standard and extended ACLs.
	46.02 Explain the rules for placement of ACLs.
	46.03 Create and apply named ACLs.
	46.04 Describe the function of firewalls.
	46.05 Use ACLs to restrict virtual terminal access.
47.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	47.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	47.02 Locate, organize and reference written information from various sources.
	47.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. Interpret verbal and nonverbal cues/behaviors that enhance communication.
	47.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	47.05 Apply active listening skills to obtain and clarify information.

	47.06 Develop and interpret tables and charts to support written and oral communications.
	47.07 Exhibit public relations skills that aid in achieving customer satisfaction.
48.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	48.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	48.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	48.03 Identify and document workplace performance goals and monitor progress toward those goals.
	48.04 Conduct technical research to gather information necessary for decision-making.
49.0	Use information technology tools. – The student will be able to:
	49.01 Use personal information management (PIM) applications to increase workplace efficiency.
	49.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	49.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	49.04 Employ collaborative/groupware applications to facilitate group work.
50.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
	50.01 Describe the nature and types of business organizations.
	50.02 Explain the effect of key organizational systems on performance and quality.
	50.03 List and describe quality control systems and/or practices common to the workplace.
	50.04 Explain the impact of the global economy on business organizations.
51.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	51.01 Evaluate and justify decisions based on ethical reasoning.
	51.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	51.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	51.04 Interpret and explain written organizational policies and procedures.

Course Number: CTS0023 **Occupational Completion Point: D** **Network Support Administrator – 150 Hours – SOC Code 15-1142**	
52.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
	52.01 Develop diplomatic methods to communicate with customers.
53.0	Participate in work-based learning experiences. – The student will be able to:
	53.01 Participate in work-based learning experiences in a network support services environment.
	53.02 Discuss the use of technology in a network support services environment.
54.0	Provide network support and assistance by troubleshooting and diagnosing through direct contact remote access. – The student will be able to:
	54.01 Apply appropriate diagnostic techniques to solve network problems.
	54.02 Perform local network support using various troubleshooting and diagnostic techniques.
	54.03 Perform remote network support using various remote access methods.
55.0	Develop electronic communications skills. – The student will be able to:
	55.01 Exhibit proficiency in using Internet services.
	55.02 Exhibit proficiency in downloading and uploading Internet information.
	55.03 Perform web-based research to solve specific network problems.
56.0	Perform logical and physical network design activities. – The student will be able to:
	56.01 Describe the various LAN communication problems.
	56.02 Describe the effects of LAN segmentation with bridges, routers, and switches.
	56.03 Describe the operation, characteristics and benefits of VLANS.
	56.04 Explain and identify LAN design goals, issues, and methodology.
	56.05 Demonstrate the ability to analyze equipment necessary to meet specific design requirement.
	56.06 Demonstrate the ability to create physical and logical network implementation documentation.

57.0	Demonstrate proficiency in selecting appropriate various routing protocols and IP routing configuration for various network designs. – The student will be able to:
57.01	Describe the two parts of network addressing, and then identify the parts in specific protocol address examples.
57.02	Create the different classes of IP addresses (and sub netting).
57.03	Configure IP addresses.
57.04	Verify IP addresses.
57.05	Identify the functions of the TCP/IP transport-layer protocols.
57.06	Identify the functions of the TCP/IP network-layer protocols.
57.07	Identify the functions performed by ICMP.
57.08	Explain the services of separate and integrated multi-protocol routing.
57.09	List problems that each routing type encounters when dealing with topology changes and describe techniques to reduce the number of these problems.
58.0	Demonstrate proficiency in using network traffic filtering to improve network performance and provide basic levels of security. – The student will be able to:
58.01	Define and describe the purpose and operation of network traffic filtering.
58.02	Demonstrate proficiency in using configuration and interface commands to perform and monitor network traffic filtering.
59.0	Perform network management activities related to documentation, security, performance, administration, troubleshooting and coping with environmental factors. – The student will be able to:
59.01	Perform documentation activities for networks, such as logs, journals, diagrams, labeling schemes, layouts, software listings, user policy, security policy.
59.02	Plan network security measures by establishing security policies and procedures, including user policies, authentication procedures, back-up and data recovery procedures, and redundancy techniques.
59.03	Demonstrate proficiency in using network monitoring software.
59.04	Explain the procedures necessary to monitor, create benchmarks, and plan for improvement of network performance.
59.05	Explain the administrative side of network management, including physical and logical boundaries, costs, error report documentation and the management of human resources.
60.0	Identify and describe various WAN functions, devices, and demonstrate understanding of the WAN design process. – The student will be able to:
60.01	Describe the functions of private addressing and be able to explain the major features of and configure NAT, PAT, and DHCP.
60.02	Describe the major features of WAN technology, including, devices, standards, encapsulation, link options, and packet and circuit switching.

	60.03 Perform WAN design activities that require using the necessary steps in WAN design, the three-layered design model, and various other design models.
61.0	Describe the operation and implementation of virtual private networks. – The student will be able to:
	61.01 Describe the virtual private network operation.
	61.02 Describe the virtual private network implementation.
	61.03 Demonstrate an understanding of tunneling.
	61.04 Describe the end-to-end virtual dialup process.
62.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	62.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	62.02 Explain emergency procedures to follow in response to workplace accidents.
	62.03 Create a disaster and/or emergency response plan.
63.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	63.01 Employ leadership skills to accomplish organizational goals and objectives.
	63.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	63.03 Conduct and participate in meetings to accomplish work tasks.
	63.04 Employ mentoring skills to inspire and teach others.
64.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	64.01 Identify and demonstrate positive work behaviors needed to be employable.
	64.02 Develop personal career plan that includes goals, objectives, and strategies.
	64.03 Examine licensing, certification, and industry credentialing requirements.
	64.04 Maintain a career portfolio to document knowledge, skills, and experience.
	64.05 Evaluate and compare employment opportunities that match career goals.
	64.06 Identify and exhibit traits for retaining employment.
	64.07 Identify opportunities and research requirements for career advancement.
	64.08 Research the benefits of ongoing professional development.

	64.09 Examine and describe entrepreneurship opportunities as a career planning option.
65.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:
	65.01 Identify and describe the services and legal responsibilities of financial institutions.
	65.02 Describe the effect of money management on personal and career goals.
	65.03 Develop a personal budget and financial goals.
	65.04 Complete financial instruments for making deposits and withdrawals.
	65.05 Maintain financial records.
	65.06 Read and reconcile financial statements.
	65.07 Research, compare and contrast investment opportunities

Course Number: CTS0024 **Occupational Completion Point: E** **Senior Network Administrator – 150 Hours – SOC Code 15-1143**	
66.0	Participate in work-based learning experiences. – The student will be able to:
66.01	Participate in work-based learning experiences in a network support services environment.
66.02	Discuss the use of technology in a network support services environment.
67.0	Compare and contrast hierarchical network design models and scalable internetworks. – The student will be able to:
67.01	Show proficiency in the use of the three-layer hierarchical design model.
67.02	Describe router functions in the core layer, distribution layer, and access layer.
67.03	Describe key characteristics of making the network reliable, available, responsive, efficient, adaptable, accessible, scalable and secure.
67.04	Compare and contrast Equal-Cost load balancing with RIP and Unequal-Cost load balancing with EIGRP.
68.0	Discuss advanced IP addressing management. – The student will be able to:
68.01	Describe and explain IPv4 addressing, Internet's address architecture, classes of IP addresses, and perform subnet masking.
68.02	Understand and explain Classless Interdomain Routing (CIDR), route aggregation, supernetting and address allocation.
68.03	Discuss and explain Variable-Length Subnet Masks along with classless and classful routing protocols.
68.04	Compare and contrast route summarization and route flapping.
68.05	Describe and discuss Network Address Translation (NAT), private addressing with NAT, private IP addresses (RFC 1918) and discontiguous subnets.
68.06	Use IP unnumbered and DHCP operations.
68.07	Configure IOS DHCP server, Easy IP and IP helper addresses.
68.08	Discuss IP addressing crisis and solutions with IPv6 address formats.
68.09	Configure IP unnumbered in a lab setting.
69.0	Demonstrate proficiency in basic router configuration. – The student will be able to:
69.01	Build ‘Start.TXT’, capture hyperterminal and telnet sessions, create access control list and extended pings, and configure VLSM using routing fundamentals.
69.02	Configure static routing and dynamic routing using distance-vector routing protocols, link-state routing protocols, and hybrid routing.

69.03	Configure static default routes and default routing with EIGRP using default route caveats and floating static routes.
69.04	Describe and explain convergence issues and route calculation fundamentals.
69.05	Start routing process using various configurations, initiate routing updates and routing metrics.
69.06	Show proficiency in migrating from RIP to EIGRP.
69.07	Configuring default routing with RIP and EIGRP, configuring floating static routes.
70.0	Demonstrate proficiency in the use of OSPF. – The student will be able to:
70.01	Discuss issues addressed by the use OSPF, list and define OSPF terminology, list OSPF states and OSPF network types, describe OSPF Hello protocol and Steps of OSPF operation.
70.02	Establish router adjacencies, elect a DR and a BDR, and discover routes.
70.03	Select appropriate routes and maintain routing information, configuring OSPF on routers within a single area.
70.04	Use optional configuration commands and configure OSPF over NBMA in a lab setting.
70.05	Describe Full-Mesh Frame Relay, Partial-Mesh Frame Relay, Point-to-Multipoint OSPF.
71.0	Understand and discuss multi-area OSPF operation and configuration. – The student will be able to:
71.01	Configure OSPF, examining the DR/BDR election process.
71.02	Configure Point-to-Multipoint OSPF over frame relay, create multiple OSPF areas, use OSPF router types, and incorporate OSPF LSA and area types.
71.03	Configuring OSPF operation across multiple areas and flooding LSUs to multiple areas, updating the routing table.
71.04	Configure Multi-area OSPF, using and configuring OSPF multi-area components, and configuring OSPF route summarization.
71.05	Verify OSPF operation, show commands, clear and debug commands.
72.0	Demonstrate the use of stub and totally stubby areas. – The student will be able to:
72.01	Use stub and totally stubby areas.
72.02	Set up stub and totally stub area criteria.
72.03	Configure stub and totally stubby areas.
72.04	Set up an OSPF stub area configuration example.
72.05	Set up an OSPF totally stubby configuration example.
72.06	Monitor multi-area OSPF, verifying multi-area OSPF operation.
72.07	Create a multi-area OSPF.

73.0	Configure and define virtual links. – The student will be able to:
	73.01 Meet the backbone area requirements.
	73.02 Configure virtual links.
	73.03 Set up a virtual link configuration example.
	73.04 Show not-so-stubby areas.
	73.05 Demonstrate how NSSA operates.
	73.06 Configure a stub area and a totally stubby area.
	73.07 Configure an NSSA and configure virtual links.
74.0	Demonstrate proficiency in the use of EIGRP. – The student will be able to:
	74.01 Define and explain EIGRP fundamentals, features, components, operations.
	74.02 Configure and monitor EIGRP in lab exercise.
75.0	Demonstrate proficiency in route optimization. – The student will be able to:
	75.01 Show how to control routing updates, policy routing, and route redistribution.
	75.02 Create a route optimization configuration in lab setting.
76.0	Demonstrate proficiency in the use of BGP. – The student will be able to:
	76.01 Define and explain autonomous systems and basic BGP operations.
	76.02 Configure and monitor BGP operations and routing process.
	76.03 Define and explain BGP attributes and the BGP decision process.
	76.04 Create BGP configuration in lab setting.
	76.05 Develop a scaling BGP and route reflectors.
	76.06 Set up BGP route filtering and policy routing.
	76.07 Explain the community attribute and peer groups.
	76.08 Explain redundancy, symmetry, and load balancing.
	76.09 Define and explain BGP redistribution.
	76.10 Perform scaling BGP lab exercises and configure BGP in a lab setting.

77.0	Define and show proficiency in security. – The student will be able to:
	77.01 Show proficiency in securing router access using access lists.
	77.02 Show proficiency in using dynamic access lists using lock-and-key.
	77.03 Show proficiency in session filtering.
	77.04 Define and explain context-based access control.
	77.05 Use an alternative to access lists.
	77.06 Configure router security in a lab setting.
78.0	Using lab equipment, demonstrate the setup, configuration, connectivity of routers to create a small WAN. – The student will be able to:
	78.01 Demonstrate the use of remote access.
	78.02 Select appropriate WAN technologies for different scenarios.
	78.03 Select remote access solutions for different technologies.
	78.04 Assemble and Cable WAN components.
79.0	Show the process of using modems and asynchronous dialup connections. – The student will be able to:
	79.01 List, describe and verify modem functions.
	79.02 Configure asynchronous interfaces and terminal lines.
80.0	Configure and verify PPP configurations. – The student will be able to:
	80.01 Demonstrate the use of PPP authentication, PPP callback, PPP compression, and PPP multilink.
	80.02 Create and verifying PPP configurations.
81.0	Configure and monitor DSL and DDR. – The student will be able to:
	81.01 Explain and discuss DSL architecture and DSL protocol layers.
	81.02 Configure DSL, static routing and default routing, and DSL PRI.
	81.03 Create optional configurations.
	81.04 Monitor the DSL interface.
	81.05 Create DSL configurations.

82.0	Configure dialer profiles. – The student will be able to:
	82.01 Demonstrate the use of Legacy DDR.
	82.02 Create and use various dialer profiles.
	82.03 Verify and monitor dialer profiles configurations.
83.0	Demonstrate proficiency in the understanding of X.25 protocols. – The student will be able to:
	83.01 Define and explain the use of X.25 in modern networks.
	83.02 Compare and contrast X.25 to frame relay.
84.0	Configure and trouble-shoot frame relay. – The student will be able to:
	84.01 Show proficiency using frame relay concepts.
	84.02 Configure frame relay.
	84.03 Create various frame relay topologies and configurations.
	84.04 Demonstrate proficiency managing frame relay traffic.
	84.05 Show the process of frame relay traffic shaping.
	84.06 Create on demand routing using frame relay.
	84.07 Trouble-shoot frame relay traffic configurations.
85.0	Demonstrate the use of WAN backup and dial backup. – The student will be able to:
	85.01 Demonstrate dial backup.
	85.02 Demonstrate backup interface operations.
	85.03 Demonstrate routing with the load backup feature.
	85.04 Verifying dial backup configurations in a lab setting.
	85.05 Create various WAN backup configurations in a lab setting.
86.0	Demonstrate the use of queuing and compression techniques. – The student will be able to:
	86.01 Demonstrate proficiency using various queuing options.
	86.02 Demonstrate proficiency optimizing traffic flow with data compression.

87.0	Demonstrate the use of scaling IP addresses with NAT. – The student will be able to:
	87.01 Define and explain NAT concepts and terminology.
	87.02 Demonstrate proficiency in configuring, creating and verifying NAT configurations in lab setting.
88.0	Demonstrate proficiency using AAA to scale access control. – The student will be able to:
	88.01 List and define AAA concepts and terminology.
	88.02 Demonstrate proficiency configuring AAA.
	88.03 Perform lab exercises using access control configurations.
89.0	Discuss and explain emerging remote-access technologies. – The student will be able to:
	89.01 List and define features and capabilities of cable, modems, wireless, network access, multichannel multipoint distribution services, local multipoint distribution services, wireless local area networking, very-high-data-rate digital subscriber line (VDSL).
90.0	Understand and describe key characteristics of various switching technologies, LAN switching and the hierarchical model of network design, and the building-block approach. – The student will be able to:
	90.01 Discuss the requirements of the evolving campus structure and the issues with traditional network designs.
	90.02 Describe the fundamental campus elements and contributing variables to campus networks.
	90.03 Compare and contrast the traditional 80/20 rule of network traffic and the new 20/80 rule of network traffic.
	90.04 Discuss switching and the OSI model, layer 2, 3, and 4 switching, and multiplayer switching.
	90.05 Discuss the core layer, the distribution layer, and the access layer in relation to switching.
	90.06 List and describe the advantages and disadvantages of the building-block approach, scaling the switch block, building the core block and layer 2 and 3 backbone scaling.
91.0	Understand and describe campus networks, design models, and switching technologies. – The student will be able to:
	91.01 List and explain key characteristics of various switching technologies.
	91.02 Discuss LAN switching and the hierarchical model of network design.
	91.03 Show proficiency using the building-block approach to networking.
92.0	List and describe various types of LAN media. – The student will be able to:
	92.01 Show proficiency using modem functions and maintaining modem auto-configurations.
	92.02 Create configurations for asynchronous connections.

93.0	Show proficiency configuring a switch. – The student will be able to:
	93.01 Demonstrate the process for initial connectivity to a switch.
	93.02 Show proficiency creating the basic configuration of a switch.
	93.03 List and explain important IOS features.
94.0	Demonstrate proficiency configuring VLANS. – The student will be able to:
	94.01 Understand and explain VLANs.
	94.02 Discuss VLAN basics and VLAN types.
	94.03 Configure a VLAN in a lab setting.
	94.04 Show use of VLAN identification techniques and VLAN trunking protocol.
	94.05 Create VTP configuration and use VTP pruning.
95.0	Understand and explain spanning tree protocol (STP) and redundant links. – The student will be able to:
	95.01 Discuss Basic STP Operations and STP Processes.
	95.02 Compare and contrast VLANs and STP.
	95.03 Show how STP is used in the Campus Network.
	95.04 Demonstrate the resolution of Redundant Links.
96.0	Demonstrate proficiency routing between VLANS. – The student will be able to:
	96.01 Understand and discuss VLAN issues.
	96.02 Route switch modules.
	96.03 Show proficiency using external routers in a lab setting.
97.0	Demonstrate proficiency with multilayer switching. – The student will be able to:
	97.01 Define and explain MLS Processes.
	97.02 Create basic MLS configurations.
	97.03 Show proficiency using flow masks.
	97.04 Show how to use MLS on the switch.

98.0	Demonstrate the use of hot standby routing protocol (HSRP). – The student will be able to:
	98.01 Define and explain HSRP operations.
	98.02 Create HSRP configurations in a lab setting.
99.0	Understand and use IGMP and multicasting. – The student will be able to:
	99.01 Define and explain multicasting.
	99.02 Understand and discuss IGMP.
	99.03 Show proficiency routing multicast traffic.
	99.04 Demonstrate proficiency using multicast routing protocols.
	99.05 Configure IP multicast routing in a lab setting.
	99.06 List and describe optional IP multicast routing tasks.
100.0	Demonstrate proficiency restricting network access. – The student will be able to:
	100.01 Show proficiency creating networking policies.
	100.02 Discuss and explain basic network security techniques.
	100.03 Demonstrate execution of policy configurations on a set of routers.
101.0	Demonstrate proficiency using network troubleshooting tools and basic network management diagnostic tools. – The student will be able to:
	101.01 Explain and discuss troubleshooting methodologies and general problem-solving concepts.
	101.02 List and define general considerations in troubleshooting.
	101.03 Define and explain each component of the general problem-solving model.
	101.04 Demonstrate proficiency using common management and diagnostic tools.
	101.05 Show proficiency using network management software.
	101.06 Demonstrate proficiency using router diagnostic commands.
	101.07 Familiarize logging and error message formats.
	101.08 Demonstrate proficiency interacting with technical support.

102.0	List and define the commonly used protocols, routing techniques, and switching processes. – The student will be able to:
102.01	List and define network services, layer 2 LAN protocols, and layer 2 WAN protocols.
102.02	Trace packets through a router.
102.03	Define and explain packet switching paths.
102.04	Identify performance issues affecting packet switching.
102.05	Define and explain low-level troubleshooting.
103.0	Demonstrate proficiency troubleshooting TCP/IP, LAN switch environment, VLANS and frame relay. – The student will able to:
103.01	List, define, and explain theory, concepts, and terminology of TCP/IP, LAN switch environment, spanning tree, VLANs and frame relay.
103.02	List, define, and explain common problems with TCP/IP and LAN switching.
103.03	List, define, and explain common scenarios with VLANs and frame relay.
103.04	Troubleshoot TCP/IP in a Windows environment; use LAN switch troubleshooting tools, explain general VLAN troubleshooting issues; list and explain the steps in frame relay troubleshooting and DSL problem isolation.
103.05	Use show commands to verify LAN switch configuration settings.
103.06	Use show and debug commands for TCP/IP, router VLANs and frame relay.
103.07	Use TCP/IP diagnostic tools.
104.0	Demonstrate proficiency troubleshooting EIGRP, OSPF, and BGP. – The student will be able to:
104.01	List, define, and explain theory, concepts, and terminology of EIGRP, OSPF, and BGP.
104.02	Demonstrate proficiency configuring AAA, EIGRP, OSPF, and BGP.
104.03	Demonstrate proficiency trouble shooting EIGRP, OSPF, and BGP.
104.04	Demonstrate proficiency using the show and debug commands for OSPF and BGP.

Course Number: CTS0029 **Occupational Completion Point: F** **Wireless Network Administrator– 150 Hours – SOC Code 15-1143**
105.0 Participate in work-based learning experiences. – The student will be able to:
105.01 Participate in work-based learning experiences in a network support services environment.
105.02 Discuss the use of technology in a network support services environment.
105.03 Discuss the management/supervisory skills needed in a network support service environment.
106.0 Demonstrate proficiency in applying radio frequency (RF) technologies. – The student will be able to:
106.01 Define and apply the basic concepts of RF behavior.
106.02 Understand the applications of basic RF antenna concepts.
106.03 Understand and apply the basic components of RF.
106.04 Identify some of the different uses for spread spectrum technologies.
106.05 Comprehend the differences between, and apply the different types of spread spectrum technologies.
106.06 Identify and apply the concepts which make up the functionality of spread spectrum technology.
106.07 Identify the laws set forth by the FCC that govern spread spectrum technology, including power outputs, frequencies, bandwidths, hop times, and dwell times.
107.0 Develop an awareness of wireless LAN technologies. – The student will be able to:
107.01 Identify and apply the processes involved in authentication and association.
107.02 Recognize the concepts associated with wireless LAN service sets.
107.03 Understand the implications of the following power management features of wireless LANs.
107.04 Specify the modes of operation involved in the movement of data traffic across wireless LANs.
108.0 Perform implementation and management activities. – The student will be able to:
108.01 Identify the technology roles for which wireless LAN technology is an appropriate technology application.
108.02 Identify the purpose of infrastructure devices and explain how to install, configure, and manage them.
108.03 Identify the purpose of wireless LAN client devices and explain how to install, configure, and manage them.

108.04	Identify the purpose of wireless LAN gateway devices and explain how to install, configure, and manage them.
108.05	Identify the basic attributes, purpose, and function of types of antennas.
108.06	Describe the proper locations and methods for installing antennas.
108.07	Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antennas.
108.08	Identify the use of wireless LAN accessories and explain how to install, configure, and manage them.
108.09	Identify, understand, correct or compensate for wireless LAN implementation challenges.
108.10	Explain how antenna diversity compensates for multipath.
108.11	Identify and understand the importance and process of conducting a thorough site survey.
108.12	Identify and understand the importance of the necessary tasks involved in preparing to do an RF site survey.
108.13	Identify the necessary equipment involved in performing a site survey.
108.14	Understand the necessary procedures involved in performing a site survey.
108.15	Identify and understand site survey reporting procedures.
109.0	Develop an awareness of wireless security systems. – The student will be able to:
109.01	Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques.
109.02	Describe types of wireless LAN security attacks, and explain how to identify and prevent them.
109.03	Given a wireless LAN scenario, identify the appropriate security solution from the following available wireless LAN security solutions.
109.04	Explain the uses of corporate security policies and how they are used to secure a wireless LAN.
109.05	Identify how and security precautions are used to secure a wireless LAN.
110.0	Demonstrate knowledge of wireless industry standards. – The student will be able to:
110.01	Identify, apply and comprehend the differences between wireless LAN standards.
110.02	Understand the roles of organizations in providing direction and accountability within the wireless LAN industry.
110.03	Identify the differences between the ISM and UNII bands.
110.04	Identify and understand the differences between the power output rules for point-to-point and point-to-multipoint links.
110.05	Identify the basic characteristics of infrared wireless LANs.

Course Number: EEV0317 **Occupational Completion Point: G** **Data Communications Analyst – 150 Hours – SOC Code 15-1143**
111.0 Participate in work-based learning experiences. – The student will be able to:
111.01 Participate in work-based learning experiences in a network support services environment.
111.02 Discuss the use of technology in a network support services environment.
111.03 Discuss the management/supervisory skills needed in a network support service environment.
112.0 Demonstrate proficiency in applying radio frequency (RF) technologies. – The student will be able to:
112.01 Define and apply the basic concepts of RF behavior.
112.02 Understand the applications of basic RF antenna concepts.
112.03 Understand and apply the basic components of RF.
112.04 Identify some of the different uses for spread spectrum technologies.
112.05 Comprehend the differences between, and apply the different types of spread spectrum technologies.
112.06 Identify and apply the concepts which make up the functionality of spread spectrum technology.
112.07 Identify the laws set forth by the FCC that govern spread spectrum technology, including power outputs, frequencies, bandwidths, hop times, and dwell times.
113.0 Develop an awareness of wireless LAN technologies. – The student will be able to:
113.01 Identify and apply the processes involved in authentication and association.
113.02 Recognize the concepts associated with wireless LAN service sets.
113.03 Understand the implications of the following power management features of wireless LANs.
113.04 Specify the modes of operation involved in the movement of data traffic across wireless LANs.
114.0 Perform implementation and management activities. – The student will be able to:
114.01 Identify the technology roles for which wireless LAN technology is an appropriate technology application.
114.02 Identify the purpose of infrastructure devices and explain how to install, configure, and manage them.
114.03 Identify the purpose of wireless LAN client devices and explain how to install, configure, and manage them.
114.04 Identify the purpose of wireless LAN gateway devices and explain how to install, configure, and manage them.

114.05	Identify the basic attributes, purpose, and function of types of antennas.
114.06	Describe the proper locations and methods for installing antennas.
114.07	Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antennas.
114.08	Identify the use of wireless LAN accessories and explain how to install, configure, and manage them.
114.09	Identify, understand, correct or compensate for wireless LAN implementation challenges.
114.10	Explain how antenna diversity compensates for multipath.
114.11	Identify and understand the importance and process of conducting a thorough site survey.
114.12	Identify and understand the importance of the necessary tasks involved in preparing to do an RF site survey.
114.13	Identify the necessary equipment involved in performing a site survey.
114.14	Understand the necessary procedures involved in performing a site survey.
114.15	Identify and understand site survey reporting procedures.
115.0	Develop an awareness of wireless security systems. – The student will be able to:
115.01	Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques.
115.02	Describe types of wireless LAN security attacks, and explain how to identify and prevent them.
115.03	Given a wireless LAN scenario, identify the appropriate security solution from the following available wireless LAN security solutions.
115.04	Explain the uses of corporate security policies and how they are used to secure a wireless LAN.
115.05	Identify how and security precautions are used to secure a wireless LAN.
116.0	Demonstrate knowledge of wireless industry standards. – The student will be able to:
116.01	Identify, apply and comprehend the differences between wireless LAN standards.
116.02	Understand the roles of organizations in providing direction and accountability within the wireless LAN industry.
116.03	Identify the differences between the ISM and UNII bands.
116.04	Identify and understand the differences between the power output rules for point-to-point and point-to-multipoint links.
116.05	Identify the basic characteristics of infrared wireless LANs.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan

with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Network Systems Administration**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	B079300
CIP Number	0511090105
Grade Level	30, 31
Standard Length	1050 hours
Teacher Certification	BUS ED 1 @2 VOE @7 TC COOP ED @7 BUS DP @7 %G ELECT DP @7 %G BOOKKEEPIN @4 7 G CLERICAL @7 7G SECRETAR 7G TEC ELEC $7 G COMPU SCI 6 COMP SVC 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1142 – Network and Computer Systems Administrators 15-1143 – Computer Network Architects
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Computer Support Assistant, Network Support Technician, Systems Administrator, Systems Engineer, Wireless Network Administrator, and Data Communications Analyst in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of seven occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	EEV0504	Computer Support Assistant	150 hours	15-1151
C	CTS0026	Network Support Technician	150 hours	15-1142
D	CTS0027	Systems Administrator	150 hours	15-1142
E	CTS0028	Systems Engineer	150 hours	15-1143
F	CTS0029	Wireless Network Administrator	150 hours	15-1143
G	EEV0317	Data Communications Analyst	150 hours	15-1143

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
16.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules.
17.0 Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment.
18.0 Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
19.0 Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems.
20.0 Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems.
21.0 Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked.
22.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
23.0 Demonstrate proficiency using graphical user interface (GUI) operating systems.
24.0 Demonstrate language arts knowledge and skills.

25.0 Demonstrate mathematics knowledge and skills.
26.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
27.0 Participate in work-based learning experiences.
28.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
29.0 Perform installation and configuration activities.
30.0 Demonstrate proficiency using computer networks.
31.0 Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers.
32.0 Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability.
33.0 Demonstrate proficiency in managing, configuring and troubleshooting storage use.
34.0 Demonstrate proficiency in configuring and troubleshooting network connections.
35.0 Demonstrate proficiency in implementing, monitoring, and troubleshooting security.
36.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
37.0 Solve problems using critical thinking skills, creativity and innovation.
38.0 Use information technology tools.
39.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
40.0 Describe the importance of professional ethics and legal responsibilities.
41.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
42.0 Participate in work-based learning experiences.
43.0 Administer accounts and resources on computers running server operating system software in a networked environment.
44.0 Modify user and computer accounts on computers running a server operating system in a networked environment.
45.0 Perform various administrative functions using groups.
46.0 Enable resource access with permissions, manage access to files and folders using permissions, and manage permission inheritance.
47.0 Implement printing in a networked environment utilizing a particular server operating system.
48.0 Set up a network-wide printing strategy to meet the needs of users and troubleshoot installation or configuration problems.
49.0 Utilize available permissions for managing access to global directory objects, how to move objects between organizational units in the same domain, and how to delegate control of an organizational unit.
50.0 Use group policy to configure folder redirection, browser connectivity, and the desktop.
51.0 Manage computer security in a networking environment.
52.0 Administer servers remotely.
53.0 Monitor server performance by using performance tools, configure and manage performance logs, configure and manage alerts, and manage system monitor views.
54.0 Collect performance data by monitoring primary server subsystems and identify system bottlenecks by using the performance monitoring software.
55.0 Maintaining device drivers.
56.0 Use software tools to manage and set up disks.
57.0 Use file encryption for security of data.
58.0 Plan for a computer disaster and use the features of a server operating system to prevent a disaster or recover when one occurs.
59.0 Manage and distribute critical software updates that resolve known security vulnerabilities and other stability issues.
60.0 Construct and assign IP addresses and isolate addressing issues associated with the IP routing process.
61.0 Configure an internet protocol (IP) address for client computers.

62.0 Configure name resolution mechanisms for clients on a network and describe the name resolution process.
63.0 Isolate common connectivity issues and describe how to use utilities and tools as part of this process.
64.0 Configure a routing solution for a network environment.
65.0 Allocate IP addressing in a network environment.
66.0 Manage the DHCP service to reflect changing client IP addressing needs and monitor DHCP server performance.
67.0 Assign computer names to the IP addresses of the source and destination hosts, and then use the computer name to contact the hosts.
68.0 Resolve host names by using domain name system.
69.0 Manage and monitor DNS servers to ensure that they are functioning properly and to optimize network performance.
70.0 Configure a server with the routing and remote access service, create appropriate remote access connections on a network access server, and configure users' access rights.
71.0 Manage and monitor network access and the network access services.
72.0 Perform installation of a network client operating system.
73.0 Install and configure hardware devices.
74.0 Configure and manage file systems.
75.0 Troubleshoot the boot process and other system issues.
76.0 Configure the desktop.
77.0 Configure IP addresses and name resolution.
78.0 Configure the client to work in a network environment.
79.0 Support remote users.
80.0 Configure a client OS for mobile computing.
81.0 Monitor resources and performance.
82.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
83.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
84.0 Explain the importance of employability skill and entrepreneurship skills.
85.0 Apply communication skills (reading, writing, speaking, listening, and viewing) in a courteous, concise, and correct manner on personal and professional levels.
86.0 Participate in work-based learning experiences.
87.0 Plan a network infrastructure.
88.0 Plan and optimize a TCP/IP physical and logical network.
89.0 Plan and troubleshoot routing.
90.0 Plan a DHCP strategy.
91.0 Plan a DNS strategy.
92.0 Optimize and troubleshoot DNS.
93.0 Plan and troubleshoot IPSEC.
94.0 Plan a network access.
95.0 Troubleshoot network access.
96.0 Analyze global director infrastructure.
97.0 Implement a global directory structure and domain.
98.0 Implement an organizational unit structure.
99.0 Implement user, group, and computer accounts.
100.0 Implement group policy.

101.0 Deploy and manage software by using group policies.
102.0 Implement sites to manage global directory replication.
103.0 Implement placement of domain controllers.
104.0 Use a framework for designing security and create a security design team.
105.0 Recognize and predict common threats by using a threat model.
106.0 Apply a framework for planning risk management.
107.0 Design security for physical resources.
108.0 Design security for computers.
109.0 Design security for accounts.
110.0 Design security for authentication.
111.0 Design security for data.
112.0 Design security for data transmission.
113.0 Design security for network perimeter.
114.0 Design an audit policy and an incident response procedure.
115.0 Participate in work-based learning experiences.
116.0 Demonstrate proficiency in applying radio frequency (RF) technologies.
117.0 Develop an awareness of wireless LAN technologies.
118.0 Perform implementation and management activities.
119.0 Develop an awareness of wireless security systems.
120.0 Demonstrate knowledge of wireless industry standards.
121.0 Participate in work-based learning experiences.
122.0 Demonstrate knowledge of general security concepts.
123.0 Develop an awareness of communication security concepts.
124.0 Develop an awareness of network infrastructure security.
125.0 Develop an awareness of cryptography and its relation to security.
126.0 Incorporate organizational and operational security in an appropriate and effective manner.

Florida Department of Education
Student Performance Standards

Program Title: Network Systems Administration
PSAV Number: B079300

Course Number: OTA0040 **Occupational Completion Point: A** **Information Technology Assistant – 150 Hours – SOC Code 15-1151**
Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: EEV0504 **Occupational Completion Point: B** **Computer Support Assistant – 150 Hours – SOC Code 15-1151**	
15.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
15.01	Develop strategies for resolving customer conflicts.
16.0	Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules. – The student will be able to:
16.01	Identify and describe the functions of main processing boards (e.g., CPUs, RAM, ROM, bus architecture).
16.02	Identify and describe the functions of communication ports (e.g., serial and parallel ports).
16.03	Identify and describe the functions of peripheral devices (e.g., scanners, modems, hard drives, printers).
16.04	Identify and describe the components of portable systems (e.g., battery, LCD, AC adapter, PDAs).
16.05	Troubleshoot, install and upgrade computers and peripherals.
16.06	Perform system hardware setup.
16.07	Demonstrate an understanding of input/output devices.
16.08	Install and configure applications software, hardware, and device drivers.
16.09	Demonstrate an understanding of the operation and purpose of hardware components.
16.10	Install operating system software.
16.11	Customize operating systems.
16.12	Install application software.
16.13	Perform storage formatting and preparation activities.
16.14	Identify data measurement (e.g., bits, bytes, kilobytes).
16.15	Install and Configure RAID.
16.16	Recognize and report on server room environmental issues (temperature, humidity/ESD/power surges, back-up).
17.0	Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment. – The student will be able to:
17.01	Troubleshoot a personal computer system.
17.02	Identify configuration problems.

	17.03 Identify software problems.
	17.04 Identify hardware malfunctions.
	17.05 Identify network malfunctions
	17.06 Resolve computer error messages.
	17.07 Understand and troubleshoot memory and cache systems.
	17.08 Verify that drives are the appropriate type.
	17.09 Describe knowledge database search procedures used to identify possible solutions when troubleshooting software and hardware problems.
18.0	Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace. – The student will be able to:
	18.01 Apply basic rules for hardware safety.
	18.02 Demonstrate proficiency in basic preventative hardware maintenance.
	18.03 Special disposal procedures that comply with environmental guidelines for batteries, CRTs, toner kits/cartridges, chemical solvents and cans, and MSDS.
	18.04 Apply ergonomic principles applicable to the configuration of computer workstations.
	18.05 Describe ethical issues and problems associated with computers and information systems.
19.0	Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems. – The student will be able to:
	19.01 Identify EDO RAM, DRAM, SRAM, RIMM, VRAM, SDRAM, and WRAM.
	19.02 Identify memory banks, memory chips (8-bit, 16-bit, and 32-bit), SIMMS (Single In-line Memory Module), DIMMS (Dual In-line Memory Module), parity chips versus non-parity chips.
	19.03 Identify printer parallel port, COM/serial port, floppy drive, hard drive, Memory, and Boot sequence.
20.0	Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems. – The student will be able to:
	20.01 Identify types of printers—Laser, Inkjet, Dot Matrix.
	20.02 Identify care and service techniques and common problems with primary printer types.
	20.03 Implement and manage printing on a network.

21.0	Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked. – The student will be able to:
21.01	Define networking and describe the purpose of a network.
21.02	Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).
21.03	Describe the various types of network topologies.
21.04	Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.
21.05	Configure network and verify network connectivity.
21.06	Discuss the responsibilities of the network administrator (e.g., rights and responsibilities).
21.07	Develop user logon procedures.
21.08	Utilize network management infrastructures (e.g., network monitoring, alerting, security) to perform administrative tasks.
21.09	Identify common backup strategies and procedures.
21.10	Select and use appropriate electronic communications software and hardware for specific tasks.
21.11	Compare and contrast Internet software and protocols.
21.12	Diagnose and resolve electronic communications operational problems.
21.13	Design and implement directory tree structures.
21.14	Install services tools (SNMP, backup software).
21.15	Perform full backup and verify backup.
21.16	Identify bottlenecks (e.g., processor, bus transfer, I/O, disk I/O, network I/O, memory).
21.17	Use the concepts of fault tolerance/fault recovery to create a disaster recovery plan.
21.18	Document and test disaster recovery plan regularly, and update as needed.
22.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, internet, remote access, or direct contact. – The student will be able to:
22.01	Apply call center vocabulary.
22.02	Listen and input information simultaneously.
22.03	Apply first response assistance for minor repair work.

23.0	Demonstrate proficiency using graphical user interface (GUI) operating systems. – The student will be able to:
	23.01 Identify parts of GUI windows.
	23.02 Create and use icons.
	23.03 Demonstrate proficiency in using menu systems.
	23.04 Demonstrate proficiency in using pointing and selection devices.
	23.05 Identify keyboard shortcuts and special function keys.
	23.06 Demonstrate proficiency in manipulating windows.
	23.07 Utilize help systems and hypertext links.
	23.08 Create, organize, and maintain file system directories.
	23.09 Organize desktop objects.
	23.10 Run multiple applications.
24.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	24.01 Locate, comprehend and evaluate key elements of oral and written information.
	24.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	24.03 Present information formally and informally for specific purposes and audiences.
25.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	25.01 Demonstrate knowledge of arithmetic operations.
	25.02 Analyze and apply data and measurements to solve problems and interpret documents.
	25.03 Construct charts/tables/graphs using functions and data.

Course Number: CTS0026 **Occupational Completion Point: C** **Network Support Technician – 150 Hours – SOC Code 15-1142**	
26.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
26.01	Develop diplomatic methods to communicate with customers.
27.0	Participate in work-based learning experiences. – The student will be able to:
27.01	Participate in work-based learning experiences in a network support services environment.
27.02	Discuss the use of technology in a network environment.
28.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact. – The student will be able to:
28.01	Apply first response assistance for minor repair work.
29.0	Perform installation and configuration activities. – The student will be able to:
29.01	Configure the operating system environment.
29.02	Connect client workstation running similar operating system to the network.
29.03	Configure Internet access for a network.
29.04	Configure a Web server.
29.05	Use remote server to deploy operating system.
29.06	Troubleshoot failed installations.
29.07	Install and configure network services for interoperability.
29.08	Monitor, configure troubleshoot and control access to printers.
29.09	Monitor, configure troubleshoot and control access to files, folders, and shared folders.
29.10	Monitor, configure troubleshoot and control access to Web sites.
30.0	Demonstrate proficiency using computer networks. – The student will be able to:
30.01	Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.

31.0	Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers. – The student will be able to:
	31.01 Configure hardware devices.
	31.02 Configure driver signing options.
	31.03 Update device drivers.
	31.04 Troubleshoot problems with hardware.
32.0	Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability. – The student will be able to:
	32.01 Monitor and optimize usage of system resources.
	32.02 Manage processes.
	32.03 Optimize disk performance.
	32.04 Manage and optimize availability of system data and user data.
	32.05 Recover systems and user data.
33.0	Demonstrate proficiency in managing, configuring and troubleshooting storage use. – The student will be able to:
	33.01 Configure and manage user profiles.
	33.02 Monitor, configure and troubleshoot disks and volumes.
	33.03 Configure data compression.
	33.04 Monitor and configure disk quotas.
	33.05 Recover from disk failures.
34.0	Demonstrate proficiency in configuring and troubleshooting network connections. – The student will be able to:
	34.01 Install, configure and troubleshoot shared access.
	34.02 Install, configure and troubleshoot a virtual private network.
	34.03 Install, configure and troubleshoot network protocols.
	34.04 Install and configure network services.
	34.05 Configure, monitor and troubleshoot remote access.
	34.06 Install, configure, monitor, and troubleshoot Terminal Services.

	34.07 Configure the properties of a connection.
	34.08 Install, configure, and troubleshoot network adapters and drivers.
35.0	Demonstrate proficiency in implementing, monitoring, and troubleshooting security. – The student will be able to:
	35.01 Encrypt data on a hard disk by using Encrypting File System.
	35.02 Implement, configure, manage and troubleshoot policies in an operating system environment.
	35.03 Implement, configure, manage and troubleshoot auditing.
	35.04 Implement, configure, manage and troubleshoot local accounts.
	35.05 Implement, configure, manage and troubleshoot account policy.
	35.06 Implement, configure, manage and troubleshoot security by using the Security Configuration Tool Set.
36.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	36.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	36.02 Locate, organize and reference written information from various sources.
	36.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	36.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	36.05 Apply active listening skills to obtain and clarify information.
	36.06 Develop and interpret tables and charts to support written and oral communications.
	36.07 Exhibit public relations skills that aid in achieving customer satisfaction.
37.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	37.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	37.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	37.03 Identify and document workplace performance goals and monitor progress toward those goals.
	37.04 Conduct technical research to gather information necessary for decision-making.
38.0	Use information technology tools. – The student will be able to:
	38.01 Use personal information management (PIM) applications to increase workplace efficiency.
	38.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.

	38.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	38.04 Employ collaborative/groupware applications to facilitate group work.
39.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
	39.01 Describe the nature and types of business organizations.
	39.02 Explain the effect of key organizational systems on performance and quality.
	39.03 List and describe quality control systems and/or practices common to the workplace.
	39.04 Explain the impact of the global economy on business organizations.
40.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	40.01 Evaluate and justify decisions based on ethical reasoning.
	40.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	40.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	40.04 Interpret and explain written organizational policies and procedures.

Course Number: CTS0027 **Occupational Completion Point: D** **Systems Administrator – 150 Hours – SOC Code 15-1142**	
41.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
	41.01 Develop diplomatic methods to communicate with customers, clients, and end-users of information technology services.
42.0	Participate in work-based learning experiences. – The student will be able to:
	42.01 Participate in work-based learning experiences in a network support services environment.
	42.02 Discuss the use of technology in a network support services environment.
	42.03 Discuss the management/supervisors skills needed in a network support services environment.
43.0	Administer accounts and resources on computers running server operating system software in a networked environment. – The student will be able to:
	43.01 Describe features of server operating system.
	43.02 Log on to the server operating system.
	43.03 Install and configure administrative tools.
	43.04 Create user accounts.
	43.05 Create computer accounts.
	43.06 Create an organizational unit.
44.0	Modify user and computer accounts on computers running a server operating system in a networked environment. – The student will be able to:
	44.01 Modify user and computer account properties.
	44.02 Enable and unlock user and computer accounts.
	44.03 Create a user account template.
	44.04 Locate user and computer accounts in a global directory structure.
	44.05 Save queries.
	44.06 Reset user and computer accounts.
	44.07 Move domain objects.

45.0	Perform various administrative functions using groups. – The student will be able to:
	45.01 Create groups.
	45.02 Manage group membership.
	45.03 Apply strategies for using groups.
	45.04 Modify groups.
	45.05 Manage default groups.
46.0	Enable resource access with permissions, manage access to files and folders using permissions, and manage permission inheritance. – The student will be able to:
	46.01 Manage access to resources.
	46.02 Manage access to shared folders.
	46.03 Manage access to files and folders by using file system permissions.
	46.04 Determine effective permissions.
	46.05 Manage access to shared files by using offline caching.
47.0	Implement printing in a networked environment utilizing a particular server operating system. – The student will be able to:
	47.01 Install and share printers.
	47.02 Manage access to printers by using shared printer permissions.
	47.03 Manage printer drivers.
	47.04 Implement printer locations.
48.0	Set up a network-wide printing strategy to meet the needs of users and troubleshoot installation or configuration problems. – The student will be able to:
	48.01 Change the location of the print spooler.
	48.02 Set printing priorities.
	48.03 Schedule printer availability.
	48.04 Configure a printing tool.

49.0	Utilize available permissions for managing access to global directory objects, how to move objects between organizational units in the same domain, and how to delegate control of an organizational unit. – The student will be able to:
	49.01 Identify the role of organizational units.
	49.02 Modify permissions for global directory objects.
	49.03 Delegate control of organizational units.
50.0	Use group policy to configure folder redirection, browser connectivity, and the desktop. – The student will be able to:
	50.01 Configure group policy settings.
	50.02 Assign scripts with group policy.
	50.03 Configure folder redirection.
51.0	Manage computer security in a security in a networking environment. – The student will be able to:
	51.01 Describe the security features a server operating system.
	51.02 Use security templates to secure computers.
	51.03 Test computer security policy.
	51.04 Configure auditing.
	51.05 Manage security logs.
52.0	Administer servers remotely. – The student will be able to:
	52.01 Explain the tasks, tools, and rights that are required to administer a server.
	52.02 Configure remote access for administration and client preferences.
	52.03 Manage remote desktop connections.
53.0	Monitor server performance by using performance tools, configure and manage performance logs, configure and manage alerts, and manage system monitor views. – The student will be able to:
	53.01 Establish a performance baseline.
	53.02 Perform real-time and logged monitoring.
	53.03 Configure and manage counter logs.
	53.04 Configure alerts.

54.0	Collect performance data by monitoring primary server subsystems and identify system bottlenecks by using the performance monitoring software. – The student will be able to:
	54.01 Explain how the four primary server subsystems affect server performance.
	54.02 Monitor server memory.
	54.03 Monitor processor usage.
	54.04 Monitor disks.
	54.05 Monitor network usage.
	54.06 Identify the guidelines for using counters and thresholds.
	54.07 Describe the best practices for monitoring server performance**.**
55.0	Maintain device drivers. – The student will be able to:
	55.01 Configure device driver signing.
	55.02 Restore the previous version of a device driver.
56.0	Use software tools to manage and set up disks. – The student will be able to:
	56.01 Initialize and partition a disk.
	56.02 View and update disk properties.
	56.03 Manage mounted drives.
	56.04 Create volumes on a disk.
	56.05 Convert a disk from basic to dynamic and from dynamic to basic.
	56.06 Import disks.
57.0	Use file encryption for security of data. – The student will be able to:
	57.01 Manage disk based file compression.
	57.02 Configure file encryption.
	57.03 Implement disk quotas.
58.0	Plan for a computer disaster and use the features of a server operating system to prevent a disaster or recover when one occurs. – The student will be able to:
	58.01 Prepare for disaster recovery.
	58.02 Back up data.

	58.03 Schedule backup jobs.
	58.04 Restore data.
	58.05 Configure a shadow copy.
	58.06 Recover from server failure.
	58.07 Select a disaster recovery method.
59.0	Manage and distribute critical software updates that resolve known security vulnerabilities and other stability issues. – The student will be able to:
	59.01 Install and configure client computers to use receive software updates.
	59.02 Install and configure servers to use perform software updates.
	59.03 Manage the Software Update Services infrastructure.
60.0	Construct and assign IP addresses and isolate addressing issues associated with the IP routing process. – The student will be able to:
	60.01 Convert IP Addresses from decimal to binary.
	60.02 Calculate a subnet mask.
	60.03 Create subnets using VLSM and CIDR.
	60.04 Isolate addressing issues associated with the IP routing process.
61.0	Configure an internet protocol (IP) address for client computers. – The student will be able to:
	61.01 Configure a client to use a static IP address.
	61.02 Configure a client to obtain an IP address automatically by using DHCP.
	61.03 Configure a client to obtain an IP address automatically by using Alternate Configuration.
62.0	Configure name resolution mechanisms for clients on a network and describe the name resolution process. – The student will be able to:
	62.01 Use ARP to identify client media access control (MAC) addresses.
	62.02 Describe the function of Network Basic Input/Output System (NetBIOS).
	62.03 Configure a client to use a static IP address.
	62.04 Configure a client to use name resolution servers.

63.0	Isolate common connectivity issues and describe how to use utilities and tools as part of this process. – The student will be able to:
	63.01 Isolate common connectivity issues.
	63.02 Use a flow chart to isolate a problem.
	63.03 Use utilities and tools to isolate a problem.
64.0	Configure a routing solution for a network environment. – The student will be able to:
	64.01 Describe the role of routing in the network infrastructure.
	64.02 Enable and configure the Routing and Remote Access service.
	64.03 Configure packet filters.
65.0	Allocate IP addressing in a network environment. – The student will be able to:
	65.01 Describe the role of DHCP in the network infrastructure.
	65.02 Add and authorize a DHCP Server service.
	65.03 Configure a DHCP scope.
	65.04 Configure DHCP options.
	65.05 Configure a DHCP reservation**.**
	65.06 Configure a DHCP relay agent.
66.0	Manage the DHCP service to reflect changing client IP addressing needs and monitor DHCP server performance. – The student will be able to:
	66.01 Manage a DHCP database.
	66.02 Monitor DHCP.
	66.03 Apply security guidelines for DHCP.
67.0	Assign computer names to the IP addresses of the source and destination hosts, and then use the computer name to contact the hosts. – The student will be able to:
	67.01 Describe the name resolution process.
	67.02 View names on a client.
	67.03 Configure host name resolution.

68.0	Resolve host names by using domain name system. – The student will be able to:
	68.01 Describe the role of DNS in the network infrastructure.
	68.02 Install the DNS Server service.
	68.03 Configure the properties for the DNS Server service.
	68.04 Configure the DNS zones.
	68.05 Configure DNS zone transfers.
	68.06 Configure dynamic updates.
	68.07 Configure a DNS client.
	68.08 Delegate authority for zones.
69.0	Manage and monitor DNS servers to ensure that they are functioning properly and to optimize network performance. – The student will be able to:
	69.01 Configure the Time-to-Live (TTL) value.
	69.02 Configure aging and scavenging.
	69.03 Integrate DNS with WINS.
	69.04 Test the DNS server configuration.
	69.05 Monitor DNS server performance**.**
70.0	Configure a server with the routing and remote access service, create appropriate remote access connections on a network access server, and configure users' access rights. – The student will be able to:
	70.01 Describe a network access infrastructure.
	70.02 Configure a virtual private network (VPN) connection.
	70.03 Configure a dial-up connection.
	70.04 Configure a wireless connection.
	70.05 Control remote user access to a network.
	70.06 Centralize authentication and policy management for network access by using Internet Authentication Service (IAS).
71.0	Manage and monitor network access and the network access services. – The student will be able to:
	71.01 Configure logging on the network access server.
	71.02 Collect and monitor network access data.

72.0	Perform installation of a network client operating system. – The student will be able to:
	72.01 Plan a client operating system installation.
	72.02 Install a client operating system.
	72.03 Upgrade a client operating system from an earlier version.
	72.04 Automate the installation process for a client operating system.
73.0	Install and configure hardware devices. – The student will be able to:
	73.01 Configure hardware devices and drivers on a computer running a client OS.
	73.02 Add and remove devices by using built in utilities and wizards.
	73.03 Restore device drivers.
74.0	Configure and manage file systems. – The student will be able to:
	74.01 Work with file systems.
	74.02 Manage data compression.
	74.03 Secure data by using EFS.
	74.04 Configure disk compression.
	74.05 Secure files by using EFS.
75.0	Troubleshoot the boot process and other system issues. – The student will be able to:
	75.01 Examine the boot process.
	75.02 Control system settings during the boot process.
	75.03 Change startup behavior.
	75.04 Use advanced boot options to troubleshoot startup problems.
	75.05 Restore a computer to a previous state.
	75.06 Troubleshoot the boot process and other system issues.

76.0	Configure the desktop. – The student will be able to:
	76.01 Configure user desktop settings.
	76.02 Customize the desktop environment.
	76.03 Configure system settings.
	76.04 Describe how user profiles and group policy affect desktop customization.
77.0	Configure IP addresses and name resolution. – The student will be able to:
	77.01 Configure IP addresses.
	77.02 Troubleshoot IP addresses.
	77.03 Determine TCP/IP name resolution methods.
	77.04 Configure a DNS and WINS client.
	77.05 Connect to a remote host.
	77.06 Configure IP addresses.
	77.07 Configure the DNS client.
78.0	Configure the client to work in a network environment. – The student will be able to:
	78.01 Examine workgroups and user accounts.
	78.02 Create and authenticate local user accounts.
	78.03 Configure local security.
	78.04 Configure logon options.
	78.05 Configure networking.
	78.06 Join a domain.
	78.07 Operate in a domain.
79.0	Support remote users. – The student will be able to:
	79.01 Establish remote access connections.
	79.02 Connect to Virtual Private Networks.

	79.03 Configure inbound connections.
	79.04 Configure authentication protocols and encryption.
	79.05 Using remote desktop.
	79.06 Store user names and passwords to facilitate remote connections.
	79.07 Configure a VPN connection.
	79.08 Configure and using remote desktop.
	79.09 Store user names and passwords.
80.0	Configure a client OS for mobile computing. – The student will be able to:
	80.01 Configure hardware for mobile computing.
	80.02 Configure power management options for mobile computing.
	80.03 Make files, folders, and web pages available for offline use.
81.0	Monitor resources and performance. – The student will be able to:
	81.01 Determine system information.
	81.02 Use task manager to monitor system performance.
	81.03 Use performance and maintenance tools to improve performance.
	81.04 Monitor event logs.
	81.05 Configure program compatibility.
82.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	82.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	82.02 Explain emergency procedures to follow in response to workplace accidents.
	82.03 Create a disaster and/or emergency response plan.
83.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	83.01 Employ leadership skills to accomplish organizational goals and objectives.
	83.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.

	83.03 Conduct and participate in meetings to accomplish work tasks.
	83.04 Employ mentoring skills to inspire and teach others.
84.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	84.01 Identify and demonstrate positive work behaviors needed to be employable.
	84.02 Develop personal career plan that includes goals, objectives, and strategies.
	84.03 Examine licensing, certification, and industry credentialing requirements.
	84.04 Maintain a career portfolio to document knowledge, skills, and experience.
	84.05 Evaluate and compare employment opportunities that match career goals.
	84.06 Identify and exhibit traits for retaining employment.
	84.07 Identify opportunities and research requirements for career advancement.
	84.08 Research the benefits of ongoing professional development.
	84.09 Examine and describe entrepreneurship opportunities as a career planning option.
	84.10 Research, compare and contrast investment opportunities.

Course Number: CTS0028 **Occupational Completion Point: E** **Systems Engineer – 150 Hours – SOC Code 15-1143**
85.0 Apply communication skills (reading, writing, speaking, listening, viewing) in a courteous, concise, and correct manner on personal and professional levels. – The student will be able to:
85.01 Communicate technical information in a concise, understandable manner to a non-technical audience both verbally and in writing.
86.0 Participate in work-based learning experiences. – The student will be able to:
86.01 Participate in work-based learning experiences in a network support services environment.
86.02 Discuss the use of technology in a network support services environment.
86.03 Compare and contrast the software applications used in a network support services environment.
87.0 Plan a network infrastructure. – The student will be able to:
87.01 Explain how to plan a network.
87.02 Explain how to prepare development and test environments.
87.03 Explain the concepts of managing and maintaining a network environment by using specific tools.
87.04 Explain the technologies and services implemented in a network.
88.0 Plan and optimize a TCP/IP physical and logical network. – The student will be able to:
88.01 Discuss TCP/IP.
88.02 Plan a TCP/IP addressing scheme.
88.03 Optimize network performance.
89.0 Plan and troubleshoot routing. – The student will be able to:
89.01 Describe how routing works.
89.02 Create a secure routing plan.
89.03 Identify TCP/IP routing trouble shooting tools.
89.04 Troubleshoot TCP/IP routing.

90.0	Plan a DHCP strategy. – The student will be able to:
	90.01 Demonstrate how DHCP operates in an enterprise environment.
	90.02 Plan a DHCP strategy.
	90.03 Secure a DHCP strategy.
91.0	Plan a DNS strategy. – The student will be able to:
	91.01 Plan a namespace strategy.
	91.02 Plan zones.
	91.03 Plan zone replication.
	91.04 Plan a DNS server implementation.
92.0	Optimize and troubleshoot DNS. – The student will be able to:
	92.01 Optimize a DNS server.
	92.02 Optimize the DNS server-to-server communications.
	92.03 Optimize DNS client support traffic.
	92.04 Troubleshoot host name resolution.
93.0	Plan and troubleshoot IPSEC. – The student will be able to:
	93.01 Discuss IPSec.
	93.02 Understand IPSec default policies, rules, and settings.
	93.03 Plan IPSec deployment.
	93.04 Troubleshoot IPSec**.**
94.0	Plan a network access. – The student will be able to:
	94.01 Select appropriate connection methods for a network access strategy.
	94.02 Select a remote access policy strategy.
	94.03 Select a network access authentication method.
	94.04 Plan a network access strategy.

95.0	Troubleshoot network access. – The student will be able to:
	95.01 Identify network access troubleshooting resources.
	95.02 Troubleshoot network authentication.
	95.03 Troubleshoot LAN authentication.
	95.04 Troubleshoot remote access.
96.0	Analyze global directory infrastructure. – The student will be able to:
	96.01 Describe the architecture of global directory.
	96.02 Describe the working of global directory.
	96.03 Use administrative tools to examine the components of global directory.
	96.04 Describe the global directory design, planning, and implementation processes.
97.0	Implement a global directory structure and domain structure. – The student will be able to:
	97.01 Create a forest and domain structure.
	97.02 Configure DNS in a global directory environment.
	97.03 Raise the functional level of a forest and a domain.
	97.04 Create trust relationships between domains.
	97.05 Secure trusts by using SID filtering.
98.0	Implement an organizational unit structure. – The student will be able to:
	98.01 Create an organizational unit.
	98.02 Delegate control for an organizational unit.
	98.03 Plan an organization unit strategy.
99.0	Implement user, group, and computer accounts. – The student will be able to:
	99.01 Describe the types of global directory accounts and groups.
	99.02 Create multiple user and computer accounts.
	99.03 Implement UPN suffixes.

99.04 Move objects within a domain and across domains in a global structure.
99.05 Plan a strategy for user computer and group accounts.
99.06 Plan a global directory audit strategy.
100.0 Implement group policy. – The student will be able to:
100.01 Create and configure group policy objects.
100.02 Manage group policy objects.
100.03 Verify and troubleshoot group policies.
100.04 Delegate administrative control of group policies.
100.05 Plan a group policies strategy for the enterprise.
101.0 Deploy and manage software by using group policies. – The student will be able to:
101.01 Explain the basic concepts of software deployment by using group policies.
101.02 Deploy software by using group policies.
101.03 Configure software deployment by using group policies.
101.04 Maintain deployed software by using group policies.
101.05 Troubleshoot some common problems with software deployment.
101.06 Plan a software deployment strategy.
102.0 Implement sites to manage global directory replication. – The student will be able to:
102.01 Explain the components and the process of replication.
102.02 Create and configure sites.
102.03 Manage a global directory site topology.
102.04 Monitor and troubleshoot global directory replication failures.
102.05 Plan a site strategy.
103.0 Implement placement of domain controllers. – The student will be able to:
103.01 Implement a global catalog in a global directory.

103.02	Determine the placement of domain controllers in a global directory.
103.03	Create a plan for placing domain controllers in a global directory.
104.0	Use a framework for designing security and create a security design team. – The student will be able to:
104.01	Describe common elements of security policies and procedures.
104.02	Create a security design framework.
104.03	Create a security design team.
105.0	Recognize and predict common threats by using a threat model. – The student will be able to:
105.01	Explain common network vulnerabilities and how attackers can exploit them.
105.02	Predict threats to security by using the STRIDE (Spoofing, Tampering, Repudiation, Information disclosure, Denial of service, Elevation of privilege) threat model.
106.0	Apply a framework for planning risk management. – The student will be able to:
106.01	Explain the purpose and operation of risk management.
106.02	Draft the elements of a risk management plan.
107.0	Design security for physical resources. – The student will be able to:
107.01	Determine threats and analyze risks to physical resources.
107.02	Design security for physical resources.
108.0	Design security for computers. – The student will be able to:
108.01	Determine threats and analyze risks to computers.
108.02	Design security for computers.
109.0	Design security for accounts. – The student will be able to:
109.01	Determine threats and analyze risks to accounts.
109.02	Design security for accounts.
110.0	Design security for authentication. – The student will be able to:
110.01	Determine threats and analyze risks to authentication.
110.02	Design security for authentication.

111.0 Design security for data. – The student will be able to:
111.01 Determine threats and analyze risks to data.
111.02 Design security for data.
112.0 Design security for data transmission. – The student will be able to:
112.01 Determine threats and analyze risks to data transmission.
112.02 Design security for data transmission.
113.0 Design security for network perimeters. – The student will be able to:
113.01 Determine threats and analyze risks to network perimeters.
113.02 Design security for network perimeters.
114.0 Design an audit policy and an incident response procedure. – The student will be able to:
114.01 Explain the importance of auditing and incident response.
114.02 Design an auditing policy.
114.03 Design an incident response procedure.

Course Number: CTS0029 **Occupational Completion Point: F** **Wireless Network Administrator – 150 Hours – SOC Code 15-1143**
115.0 Participate in work-based learning experiences. – The student will be able to:
115.01 Participate in work-based learning experiences in a network support services environment.
115.02 Discuss the use of technology in a network support services environment.
115.03 Discuss the management/supervisory skills needed in a network support service environment.
116.0 Demonstrate proficiency in applying radio frequency (RF) technologies. – The student will be able to:
116.01 Define and apply the basic concepts of RF behavior.
116.02 Understand the applications of basic RF antenna concepts.
116.03 Understand and apply the basic components of RF.
116.04 Identify some of the different uses for spread spectrum technologies.
116.05 Comprehend the differences between, and apply the different types of spread spectrum technologies.
116.06 Identify and apply the concepts which make up the functionality of spread spectrum technology.
116.07 Identify the laws set forth by the FCC that govern spread spectrum technology, including power outputs, frequencies, bandwidths, hop times, and dwell times.
117.0 Develop an awareness of wireless LAN technologies. – The student will be able to:
117.01 Identify and apply the processes involved in authentication and association.
117.02 Recognize the concepts associated with wireless LAN service sets.
117.03 Understand the implications of the following power management features of wireless LANs.
117.04 Specify the modes of operation involved in the movement of data traffic across wireless LANs.
118.0 Perform implementation and management activities. – The student will be able to:
118.01 Identify the technology roles for which wireless LAN technology is an appropriate technology application.
118.02 Identify the purpose of infrastructure devices and explain how to install, configure, and manage them.
118.03 Identify the purpose of wireless LAN client devices and explain how to install, configure, and manage them.

118.04	Identify the purpose of wireless LAN gateway devices and explain how to install, configure, and manage them.
118.05	Identify the basic attributes, purpose, and function of types of antennas.
118.06	Describe the proper locations and methods for installing antennas.
118.07	Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antennas.
118.08	Identify the use of wireless LAN accessories and explain how to install, configure, and manage them.
118.09	Identify, understand, correct or compensate for wireless LAN implementation challenges.
118.10	Explain how antenna diversity compensates for multipath.
118.11	Identify and understand the importance and process of conducting a thorough site survey.
118.12	Identify and understand the importance of the necessary tasks involved in preparing to do an RF site survey.
118.13	Identify the necessary equipment involved in performing a site survey.
118.14	Understand the necessary procedures involved in performing a site survey.
118.15	Identify and understand site survey reporting procedures.
119.0	Develop an awareness of wireless security systems. – The student will be able to:
119.01	Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques.
119.02	Describe types of wireless LAN security attacks, and explain how to identify and prevent them.
119.03	Given a wireless LAN scenario, identify the appropriate security solution from the following available wireless LAN security solutions.
119.04	Explain the uses of corporate security policies and how they are used to secure a wireless LAN.
119.05	Identify how and security precautions are used to secure a wireless LAN.
120.0	Demonstrate knowledge of wireless industry standards. – The student will be able to:
120.01	Identify, apply and comprehend the differences between wireless LAN standards.
120.02	Understand the roles of organizations in providing direction and accountability within the wireless LAN industry.
120.03	Identify the differences between the ISM and UNII bands.
120.04	Identify and understand the differences between the power output rules for point-to-point and point-to-multipoint links.
120.05	Identify the basic characteristics of infrared wireless LANs.

Course Number: EEV0317 **Occupational Completion Point: G** **Data Communications Analyst – 150 Hours – SOC Code 15-1143**
121.0 Participate in work-based learning experiences. – The student will be able to:
121.01 Participate in work-based learning experiences in a network support services environment.
121.02 Discuss the use of technology in a network support services environment.
121.03 Discuss the management/supervisors skills needed in a network support services environment.
122.0 Demonstrate a knowledge of general security concepts. – The student will be able to:
122.01 Describe access control.
122.02 Describe network authentication.
122.03 Understand the various types of network attacks (backdoors, DOS, spoofing).
122.04 Identify and modify non-essential services and protocols.
122.05 Identify malicious code (virus, worm, Trojan).
122.06 Configure system auditing, logging, and scanning as it relates to security procedures.
123.0 Develop an awareness of communication security concepts. – The student will be able to:
123.01 Describe remote access protocols (VPN, RADIUS, L2TP).
123.02 Identify E-mail security concerns (hoaxes, spam).
123.03 Identify web (HTML) security concepts and designs (HTTP/S, IM).
123.04 Demonstrate an awareness of file transfer security concerns.
123.05 Describe and identify wireless networking security concerns and vulnerabilities.
124.0 Develop an awareness of network infrastructure security. – The student will be able to:
124.01 Install and configure network firewalls.
124.02 Identify security concerns with various wiring media (copper, fiber).
124.03 Identify security concerns associated with removable media and storage devices.
124.04 Demonstrate an awareness of security topologies (security zones, Intranets, NAT).

	124.05 Configure and use intrusion detection software.
	124.06 Establish security baselines (updates, patches, hot fixes, Access Control lists).
	124.07 Demonstrate the ability to configure a Virtual Private Network (VPN).
	124.08 Describe the function of Network Address Translation (NAT).
125.0	Develop an awareness of cryptography and its relation to security. – The student will be able to:
	125.01 Demonstrate an understanding of security algorithms and encryption.
	125.02 Use and apply Public Key Certificates.
	125.03 Demonstrate an understanding of standards and protocols in commerce.
126.0	Incorporate organizational and operational security in an appropriate and effective manner. – The student will be able to:
	126.01 Describe how to establish a network security policy.
	126.02 Explain the importance of physical security to protect network resources.
	126.03 Identify and use disaster recovery procedures.
	126.04 Describe the importance of business continuity and its relationship to network and corporate security.
	126.05 Describe security policies and procedures that would be used in a business environment.
	126.06 Explain the importance of privilege management (access, password management, sign-on).
	126.07 Describe the concept of forensics as it applies to network security (obtaining evidence of security breaches).
	126.08 Explain the importance of educating users and supervisors in regard to network security.
	126.09 Create documentation that describes standards and guidelines for a network security system.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Game/Simulation/Animation Visual Design**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	B082100
CIP Number	0550041114
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @7 7G DIGI MEDIA 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other 27-1014 – Multimedia Artists and Animators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

Purpose

This program offers a sequence of project-based courses that provide coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster such as Game or Simulation Designer, Game or Simulation Graphic Artist, and Game or Simulation 3-D Animator; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to practical experiences in game/simulation conceptualization, design, storyboarding, development methodologies, 2D/3D animation design and production, and implementation issues. Specialized skills involving graphic animation software are used to produce a variety of two and three dimensional components.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIG0070	Game/Simulation Designer	300 hours	15-1199
B	DIG0071	Game/Simulation Graphic Artist	150 hours	27-1014
C	DIG0072	Game/Simulation 3D Animator	150 hours	27-1014

Note: OTA0040 is a highly recommended core.

Program Recommendations

The Game, Simulation and Animation Visual program emphasizes the development of technical abilities as well as ethical and societal awareness necessary to function in a highly technological society. The use of cooperative learning groups is recommended. By learning and practicing group process skills, students will be prepared to work "together" in real work situations. Program graduates will develop enhanced self-esteem as well as the problem solving and teamwork skills necessary to succeed in careers and postsecondary education.

The Game, Simulation & Animation Visual Design program places a strong emphasis on workplace learning. Job shadowing and mentoring experiences with game and simulation professionals along with on-site trips to local businesses connect classroom learning to the workplace. In-class guest speakers bring the real world into the classroom.

The Foundations and Design courses should be taken in sequence prior to the 2D Graphic Development and 3D Graphic Animation courses. The 2D Graphic Development and 3D Graphic Animation courses may be taken concurrently.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game.
02.0 Use information technology tools.
03.0 Design and create a playable game.
04.0 Categorize the different gaming genres.
05.0 Categorize different gaming platforms.
06.0 Understand the historical significance of electronic and non-electronic games.
07.0 Describe the trends in current and future game development.
08.0 Identify the business model commonly used in game development industries.
09.0 Examine and categorize the significant processes in the production of games.
10.0 Understand the core tasks and challenges that face a video game design team.
11.0 Identify legal issues that affect games, developers and players.
12.0 Demonstrate the professional level of written and oral communication required in the game development industry.
13.0 Investigate career opportunities in the game industry.
14.0 Demonstrate an understanding of the vocabulary of the industry for discussing games and play.
15.0 Demonstrate research and information fluency.
16.0 Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design.
17.0 Identify popular games and identify commonality between them.
18.0 Understand the general procedure and requirements of game design.
19.0 Explore the methods used to create and sustain player immersion.
20.0 Become familiar with popular game tools such as DirectX, 3DMax, and different gaming engines.
21.0 Demonstrate language arts knowledge and skills.
22.0 Demonstrate mathematics knowledge and skills.
23.0 Demonstrate science knowledge and skills.
24.0 Create a working game or simulation individually or as part of a team.
25.0 Describe the game development life cycle.
26.0 Identify hardware constraints on video games including processors and I/O devices.
27.0 Understand the general principles of storytelling.
28.0 Understand character archetypes and character design.
29.0 Understand the use of storyboarding in game design.
30.0 Develop a game design document or cut.
31.0 Understand outlining in game designs.
32.0 Explore elements of puzzle design.
33.0 Discuss game designer strategy considerations.
34.0 Understand the process of creating and designing player choice.
35.0 Create and design the game flow as it relates to story and plot.
36.0 Assess common principles and procedures in game flow design.
37.0 Describe player challenge rule creation elements.
38.0 Identify tools and software commonly used in game development.

39.0 Understand the technical methodologies for integrating digital media into a game or simulation.
40.0 Identify commonly used art and animation production tools in the game design industry.
41.0 Understand the general concepts of environmental design.
42.0 Describe how environmental design is used in conjunction with game level design.
43.0 Describe pertinent issues facing game designers.
44.0 Describe Monte Carlo simulation as it relates to game design.
45.0 Understand the use of inventory systems in game design.
46.0 Use information technology tools.
47.0 Describe the roles within a game studio.
48.0 Describe the importance of professional ethics and legal responsibilities.
49.0 Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 2D game graphics.
50.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets.
51.0 Understand the various job titles and responsibilities of a 2D artist as it relates to the game industry.
52.0 Develop the art direction for a 2D game.
53.0 Determine and document the graphical and animation needs of a game using design documents including art direction and reference materials.
54.0 Understand the fundamentals of drawing and painting techniques.
55.0 Demonstrate a working knowledge of vector and paint programs used to make 2D graphics and animation.
56.0 2D world building, making graphics and backgrounds for 2D side scrolling, top down, and Isometric projection.
57.0 Understand the principles of Sprite animation as it relates to 2D game graphics (walk, run, Jump, idle).
58.0 Facial animation, expressions, and audio lip syncing.
59.0 Create graphics for the user interface including titles and button states.
60.0 Effects design and other in-game effects such as lighting and shadows.
61.0 Demonstrate the effective use art input devices.
62.0 Demonstrate leadership and teamwork skills needed, as it relates to game/simulation development, to accomplish team goals and objectives.
63.0 Explain the importance of employability skill and entrepreneurship skills as it relates to game/simulation development.
64.0 Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 3D game graphics.
65.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets.
66.0 Understand the various job titles and responsibilities of a 3D artist as it relates to the game industry.
67.0 Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 3D game graphics.
68.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets.
69.0 Understand the various job titles and responsibilities of a 3D artist as it relates to the game industry.
70.0 Develop the art direction for a 3D game.
71.0 Determine and document the graphical and animation needs of a game using design documents including art direction and reference materials.
72.0 Understand the fundamentals of drawing and painting techniques.
73.0 Demonstrate a working knowledge of modeling and paint programs used to make 3D graphics and animation.
74.0 3D world building, making graphics and backgrounds for 3D side scrolling, top down, and Isometric projection.
75.0 Understand the principles of Sprite animation as it relates to 3D game graphics (walk, run, Jump, idle).
76.0 Facial animation, expressions, and audio lip syncing.
77.0 Create graphics for the user interface including titles and button states.

78.0 Particle system design and other in-game effects such as lighting and shadows.

Florida Department of Education
Student Performance Standards

Program Title: **Game, Simulation, Animation Programming**
PSAV Number: **B082100**

Course Number: DIG0070 **Occupational Completion Point: A** **Game/Simulation Designer – 300 Hours – SOC Code 15-1199**	
01.0	Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game. – The student will be able to:
01.01	Use industry standard game design production documents to create a game design production plan.
02.0	Use information technology tools. – The student will be able to:
02.01	Use personal information management (PIM) applications to increase workplace efficiency.
02.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
03.0	Design and create a playable game. – The student will be able to:
03.01	Use a number of computer tools to enhance and ease game programming and artistry.
03.02	Use a game engine to create a playable game.
03.03	Use animated objects.
03.04	Integrate sound and music to enhance the game experience.
03.05	Test and debug to game completion.
04.0	Categorize the different gaming genres. – The student will be able to:
04.01	Research, compare and categorize the different gaming genres.
04.02	Analyze examples of different gaming genres.
04.03	Define and use the necessary vocabulary related to gaming and the different genres.
05.0	Categorize different gaming platforms. – The student will be able to:
05.01	Research, compare and categorize different gaming platforms.
05.02	Analyze the distinctive features of each system.

	05.03 Define the target audience for different platforms based on features, available games, and price of system and games.
	05.04 Define and use the necessary vocabulary related to gaming platforms.
06.0	Understand the historical significance of electronic and non-electronic games. – The student will be able to:
	06.01 Discuss the history of non-electronic games.
	06.02 Describe the history and theory of mainstream and experimental media including radio, movies, television, art, and theatre.
	06.03 Explain the historical timeline of electronic games, marking the significant highlights in their evolution.
07.0	Describe the trends in current and future game development. – The student will be able to:
	07.01 Determine and analyze the significant trends in game development in the past two decades.
	07.02 Research and brainstorm the possibilities for the future of electronic games based on current and emerging technologies and future predictions.
08.0	Identify the business model commonly used in game development industries. – The student will be able to:
	08.01 Identify, define and discuss the different ways games are funded, marketed and sold.
	08.02 Identify and describe licensing management for different gaming platforms.
	08.03 Discuss the product value and business differences between major game platforms.
	08.04 Identify successful business models and analyze various facets of those models, such as market analysis, marketing strategy, and product value.
	08.05 Discuss the opportunities available to independent game developers and entrepreneurs in the mobile application market.
09.0	Examine and categorize the significant processes in the production of games. – The student will be able to:
	09.01 Discuss the relationships between publishers, developers, distributors, marketers, and retailers.
	09.02 Identify processes of development including content creation, team roles, design documentation, and process management.
	09.03 Explore and describe the effects of globalization on the design and production of video games.
10.0	Understand the core tasks and challenges that face a video game design team. – The student will be able to:
	10.01 Identify and define the roles and responsibilities of team members on a video game design team.
	10.02 Describe the effects of group dynamics and the importance of team building for a design team.
	10.03 Explore and discuss methods of communications and scheduling for design teams.
	10.04 Describe the importance and interrelationship between development schedule and budget constraints in video game design.

11.0	Identify legal issues that affect games, developers and players. – The student will be able to:
11.01	Define and discuss intellectual property and contract law as it relates to the gaming industry.
11.02	Describe legal and liability issues that could affect online communities.
11.03	Compare and contrast government and industry content regulation and industry ratings of video games.
12.0	Demonstrate the professional level of written and oral communication required in the game development industry. – The student will be able to:
12.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.
12.02	Organize ideas and communicate oral and written messages appropriate for the game development industry environment.
12.03	Identify, define, and discuss terminology appropriate for both internal and external communications in the game development industry environment.
12.04	Compose electronic documents used to facilitate formal and informal communication in the game industry such as letters, reports, memos, emails, presentations, budgets, charts and calendars.
13.0	Investigate career opportunities in the game industry. – The student will be able to:
13.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.
13.02	Analyze job and career requirements and relate career interests to opportunities in the global economy.
13.03	Describe job requirements for a variety of occupations within the game development industry.
13.04	Identify current employment trends and career opportunities in the game industry.
13.05	Evaluate personal aptitude and skills to match specific employment opportunities.
13.06	Develop an educational plan to acquire the skills and requirements of a selected employment opportunity within the game industry.
14.0	Demonstrate an understanding of the vocabulary of the industry for discussing games and play. – The student will be able to:
14.01	Identify, define, and discuss professional game design and analysis terminology appropriate for internal and external communications in a game design environment.
14.02	Identify and define the vocabulary used by game players and online gaming communities.
15.0	Demonstrate research and information fluency. - The student will be able to:
15.01	Locate, analyze, process, and organize data from multiple sources including the Internet.
15.02	Play games to research and collect game play data.
15.03	Evaluate, analyze and document game styles and playability.
15.04	Determine the dramatic elements in games, including kinds of fun, player types and nonlinear storytelling.

16.0	Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow and game design. – The student will be able to:
16.01	Test and analyze games to determine the quality of rules, interfaces, navigation, performance, play, artistry and longevity in design and structure.
16.02	Research and evaluate the game analysis techniques used by the video game industry.
16.03	Identify the key elements in a game and make intelligent judgments about whether the game succeeded or failed in its objectives.
16.04	Evaluate professional reviews and write a critical analysis of a current video game.
17.0	Identify popular games and identify commonality between them. – The student will be able to:
17.01	Analyze and deconstruct game environments and interactions.
17.02	Compare and contrast the top selling video games in terms of player interaction, plot complexity, and reward.
17.03	Categorize gameplay elements by player type. (killer, talker, explorer and achiever).
18.0	Understand the general procedure and requirements of game design. – The student will be able to:
18.01	Describe the design process from conception to production.
18.02	Explain the iterative nature of game design through the different stages of design iterations including pre-alpha, alpha, beta, release candidate, going gold and support.
18.03	Develop design plans, for example, character sketches, documentation and storyboards for proposed games.
19.0	Explore the methods used to create and sustain player immersion. – The student will be able to:
19.01	Research and define the term “player immersion”.
19.02	Explore and explain the factors that create player immersion in a game.
19.03	Examine popular games and explain the methods each game uses to increase player immersion.
20.0	Become familiar with popular game technology such as DirectX, 3DMAX, and different gaming engines. – The student will be able to:
20.01	Identify and discuss the popular game development tools currently used in the industry.
20.02	Identify and discuss popular gaming engines.
20.03	Research and analyze the uses for different game development tools.

21.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	21.01 Locate, comprehend and evaluate key elements of oral and written information.
	21.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	21.03 Present information formally and informally for specific purposes and audiences.
22.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	22.01 Demonstrate knowledge of arithmetic operations.
	22.02 Analyze and apply data and measurements to solve problems and interpret documents.
	22.03 Construct charts/tables/graphs using functions and data.
23.0	Demonstrate science knowledge and skills. – The student will be able to:
	23.01 Discuss the role of creativity in constructing scientific questions, methods and explanations.
	23.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.	
24.0	Create a working game or simulation individually or as part of a team. – The student will be able to:
24.01	Create a storyboard describing the essential elements, plot, flow, and functions of the game/simulation.
24.02	Create a design specification document to include interface and delivery choices, rules of play, navigation functionality, scoring, media choices, start and end of play, special features, and development team credits.
24.03	Using a simple game development tool, create a game or simulation.
24.04	Present the game or simulation.
25.0	Describe the game development life cycle. – The student will be able to:
25.01	Identify steps in the pre-production process including the proof of concept and market research.
25.02	Describe the iterative prototyping process – Alpha, Beta, RTM.
25.03	Determine platform, technology and scripting requirements.
25.04	Implement techniques of scenario development, levels, and missions.
25.05	Discuss game testing requirements and methods.
25.06	Identify and describe maintenance, upgrade and sequel issues.
26.0	Identify hardware constraints on video games including processors and I/O devices. – The student will be able to:
26.01	Identify the different control systems for video games.
26.02	Compare and contrast personal computer and video game console hardware, including display systems.
26.03	Explain the factors that can limit the game-playing ability of personal computers.
27.0	Understand the general principles of storytelling. – The student will be able to:
27.01	Identify the essential elements of a story.
27.02	Describe how creative writing is used as a game design tool.
27.03	Compare and contrast methods of delivering a story in a game.
28.0	Understand character archetypes and character design. – The student will be able to:
28.01	Research and identify common character archetypes used in computer games.
28.02	Design character prototypes to physically match archetype.

	28.03 Apply symbolize and semiotic design elements within character design to convey meaning.
	28.04 Create character backstory and profile.
29.0	Understand the use of storyboarding in game design. – The student will be able to:
	29.01 Assess the techniques used in the gaming industry for rendering basic Game Design Art.
	29.02 Describe how game layout charts are used in game design.
	29.03 Describe how storyboards in the game design process can be used as a pre-development sales tool.
	29.04 Analyze and compare the use of storyboards in the game design industry with regard to environmental illustrations, level designs, character designs, model sheets and GUI Designs.
30.0	Develop a game design document or cut. – The student will be able to:
	30.01 Evaluate and discuss the choice of delivery system.
	30.02 Evaluate and discuss choices of genre, game design software, art, digital media, and animation software.
	30.03 Create a game strategy overview, character overview, and storyboard overview.
	30.04 Define the rules of play and multi-player options.
	30.05 Create the layout and interfaces overview and digital media overview.
	30.06 Determine the gameplay interaction requirements and create the progression levels overview.
	30.07 Define strategic positioning of game immersion dynamics and psychological effect.
	30.08 Identify hardware and software constraints.
31.0	Understand outlining in game designs. – The student will be able to:
	31.01 Assess techniques of goal design in gaming.
	31.02 Describe the concept of nested victories.
	31.03 Discuss the use of players as agents of change.
	31.04 Compare and contrast examples of understandable context in gaming.
	31.05 Discuss the principles underlying the creation of understandable rules.
	31.06 Describe how skill building is used in game design.
	31.07 Describe conventional techniques of positive feedback.
	31.08 Discuss functional consistency as it relates to the use of interfaces.

32.0	Explore elements of puzzle design. – The student will be able to:
	32.01 Describe the essential elements of a puzzle.
	32.02 Identify the different types of puzzles.
	32.03 Describe the basic principles of high-level puzzle design.
	32.04 Describe the basic principles of low-level puzzle design.
33.0	Discuss game designer strategy considerations. – The student will be able to:
	33.01 Describe the use of artificial intelligence challenges in game design and the need for giving the player rest time between challenges.
	33.02 Evaluate the impact of randomness in game design especially as it pertains to pattern recognition.
	33.03 Identify techniques used in the industry to help the player to navigate.
	33.04 Explain the use of “just barely” victories and failures as an exciting and immersive technique.
	33.05 Assess techniques used to provide a range of challenges and appeal to a wide range of abilities.
	33.06 Describe the psychological cost of failure in games as it pertains to immersion and psychological effect.
	33.07 Identify methods of preparing the player for greater challenge while allowing for plot development as the story serves the game.
34.0	Understand the process of creating and designing player choice. – The student will be able to:
	34.01 Discuss the principles of player-centric design.
	34.02 Research and correlate game complexity level to appropriate age group such that content matches user skill set required.
	34.03 Examine and discuss design elements that encourage continuous active engagement both mental and physical.
	34.04 Analyze design elements that maintain player interest and vary the degree of challenge.
	34.05 Discuss the need for a balance of design elements for the purpose of rewarding and frustrating players.
35.0	Create and design the game flow as it relates to story and plot. – The student will be able to:
	35.01 Identify techniques of introducing the story plot and beginning play.
	35.02 Describe story plot development techniques for the middle of play in game design.
	35.03 Analyze and discuss planning techniques for climax and finale of games.

36.0	Assess common principles and procedures in game flow design. – The student will be able to:
36.01	Assess missions and scenarios game flow techniques.
36.02	Describe common use of mission design and campaigns.
36.03	Evaluate usage of static versus dynamic campaigns.
37.0	Describe player challenge rule creation elements. – The student will be able to:
37.01	Research common design methods for clearing obstacles or series of obstacles.
37.02	Describe common design elements introducing skill, luck and combinations including escalating challenges to games.
37.03	Identify common design elements used to vary weapons, characters and tools.
37.04	Discuss the incorporation of risk reward and adaptive challenges (AI).
37.05	Evaluate industry use of boss encounters in games.
37.06	Analyze and discuss design considerations from the perspective of other players and multi-player environments.
38.0	Identify tools and software commonly used in game development. – The student will be able to:
38.01	Identify and discuss the popular game development tools currently used in the industry.
38.02	Identify and discuss popular gaming engines.
38.03	Identify and discuss popular world building tools.
39.0	Understand the technical methodologies for integrating digital media into a game or simulation. – The student will be able to:
39.01	Survey and discuss the use of naming conventions and temp sounds.
39.02	Analyze and discuss methods of matching sound effects to art assets.
39.03	Identify and categorize commonly used technology sound engine integration equipment.
39.04	Identify and discuss resources such as sound effects libraries.
39.05	Examine methods of sound implementation and associated software.
39.06	Describe how and why digital video may be integrated into a game or simulation design.
39.07	Describe how special effects differ from animation.

40.0	Identify commonly used art and animation production tools in the game design industry. – The student will be able to:
40.01	Identify, categorize and discuss art and animation tools commonly used in game design.
41.0	Understand the general concepts of environmental design. – The student will be able to:
41.01	Survey and evaluate commonly used concept art.
41.02	Create a world sketch with particular attention to maintaining continuity of style.
41.03	Describe the emotional/psychological aspects of environmental design that signify mood, façade of freedom, and resource struggling.
42.0	Describe how environmental design is used in conjunction with game level design. – The student will be able to:
42.01	Examine and evaluate examples of focus on a theme.
42.02	Describe methods of creating a purposeful architecture giving consideration to continuity and themes and taking advantage of revisiting.
42.03	Consider and discuss environmental design elements for multi-player or single player games.
42.04	Describe the history of creating shifts in game design environments and embracing novel ideas.
42.05	Identify and discuss environmental design pitfalls such as red herrings and cookie-cutter layouts.
43.0	Describe pertinent issues facing game designers. – The student will be able to:
43.01	Discuss the meaning of simulation and give examples of simulation and complexity including architecture, exposure, concealment and heuristics.
43.02	Describe applied event modeling including goal discovery, map making, event exploration, developing incentives and learning in event modeling for games.
43.03	Explain the concepts of modes of understanding, inductive and iconic logic, significance and saturation in event modeling for game design.
44.0	Describe Monte Carlo simulation as it relates to game design. – The student will be able to:
44.01	Discuss the process of specifying events including contexts of simulation, translating event models to simulations, formalizing thematic objectives, prototyping, interface design and use cases with modeling.
44.02	Discuss the process of designing entities including behavior and entity graphics.
44.03	Describe the implementation of entities including enumerating animations, playing with time, creating events, adding an entity class, and creating entity events and behaviors.
44.04	Analyze event modeling in creating a world including the creation of a world class, adding and removing entities, accessing entities, updating and rendering, adding scene hierarchies and handling world events.
44.05	Assess and discuss AI and physics issues for simulation including AI event contexts, adding intelligence and gravity, adding collision detection, updating for collisions and applying mass and force.
44.06	Discuss environmental elements of simulation including logic, cognitive saturation, systems and interpretation, context of reality, shadows and lighting.

	44.07	Discuss the simulation of physical systems such as trees and forests and related events such as fires, or insect swarms such as beehives, bird flocks or anthills.
	44.08	Describe the simulation of social and economic systems including practical applications, historical precedents, modeling for community events, creation of communities including structures, states events and rendering and altering building states, population behaviors, and controlling influences.
	44.09	Describe the process of testing simulations and event models including effectiveness, diagrammatic systems evaluation, context influence, path transitions and assessing messages.
45.0	Understand the use of inventory systems in game design. – The student will be able to:	
	45.01	Discuss the various methods of describing items in player's inventory in contemporary game design.
	45.02	Review and discuss industry methods of communicating how inventory items can have an effect on game play.
46.0	Use information technology tools. – The student will be able to:	
	46.01	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	46.02	Employ computer operations applications to access, create, manage, integrate, and store information.
	46.03	Employ collaborative/groupware applications to facilitate group work.
47.0	Describe the roles within a game studio. – The student will be able to:	
	47.01	Describe the nature and types of business organizations.
	47.02	Explain the effect of key organizational systems on performance and quality.
	47.03	List and describe quality control systems and/or practices common to the workplace.
	47.04	Explain the impact of the global economy on business organizations.
48.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:	
	48.01	Evaluate and justify decisions based on ethical reasoning.
	48.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	48.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	48.04	Interpret and explain written organizational policies and procedures.

Course Number: DIG0071 **Occupational Completion Point: B** **Game/Simulation Graphic Artist – 150 Hours – SOC Code 27-1014**	
49.0	Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 2D game graphics. – The student will be able to:
49.01	Identify styles of art and trends such as surrealism, pop art, and expressionism by viewing reproductions, prints, videos, periodicals, books or Internet sites.
49.02	Identify art styles from various historical periods.
49.03	Use concise vocabulary to compare and contrast artistic elements and design principles in personal works and the works of others.
49.04	Explore the details in works noting the use of materials, lighting and features that contribute to the overall feel and mood of the work.
50.0	Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets. – The student will be able to:
50.01	Understand the use of “Fair use and Fair Dealing”.
50.02	Understand the transfer and licensing of creative works.
50.03	Understand the use of “exclusive rights” to intellectual creations.
50.04	Demonstrate the use of digital watermarking.
51.0	Understand the various job titles and responsibilities of a 2D artist as it relates to the game industry. – The student will be able to:
51.01	Identify the job titles of visual artist used in a 2D game project.
51.02	Demonstrate the ability to work as part of an art team.
51.03	Perform the role of the concept artist for a 2D game project.
51.04	Perform the role of the art director for a 2D game project.
51.05	Perform the role of the texture artist for a 2D game project.
51.06	Perform the role of the environment artist for a 2D game project.
52.0	Develop the art direction for a 2D game. – The student will be able to:
52.01	Develop a vision for visual elements of a 2D game.
52.02	Effectively convey the mood or psychological appeal of the game to the target audience through the use of visual styles.
52.03	Create conceptual game art using various techniques, emphasizing space and form through range of value, placement, reflections, and shadows.

	52.04 Create character sketches, architectural sketches and background sketches for the concept artist to render from.
	52.05 Develop the game design documents, including schedules and technical specifications for the art team.
	52.06 Understand the challenges of art direction as it relates to mobile devices.
53.0	Determine and document the graphical and animation needs of a game using design documents including art direction and reference materials. – The student will be able to:
	53.01 Understand the design requirements and limitations of a 2D game engine.
	53.02 Develop characters and game elements in respect to the art direction laid out in the design documents.
	53.03 Determine the appropriate file format vector based resolution independent vs. rasterized graphics which are resolution dependent.
	53.04 Understand the different aspects of quality and detail in relation to performance and size.
	53.05 Understand the role of naming conventions as it applies to creative assets storage used in the work flow.
	53.06 Demonstrate the effective use of alternative resolutions, scaling and file formats.
54.0	Understand the fundamentals of drawing and painting techniques. – The student will be able to:
	54.01 Demonstrate the use (traditional or digital) of inks, watercolors, acrylics, oils, and mixed media in a 2D game.
	54.02 Demonstrate the use of different techniques, format, media or style.
	54.03 Understand the use of primitives.
	54.04 Demonstrate basic understanding of composition of a scene.
	54.05 Understand the shape of the human form.
	54.06 Know the value of lights and shadows.
55.0	Demonstrate a working knowledge of vector and paint programs used to make 2D graphics and animation. – The student will be able to:
	55.01 Know the difference between Vectors and Bitmaps.
	55.02 Demonstrate understanding of various 2D art programs.
	55.03 Utilize the programs tools and brushes.
	55.04 Know the importance of Layers.
	55.05 Identify file formats.

56.0	2D world building, making graphics and backgrounds for 2D side scrolling, top down, and Isometric projection. – The student will be able to:
56.01	Know the importance of scale in relation to the player.
56.02	Understand 2D level design to successfully lead the player.
56.03	Effectively use 2D graphics to convey mood and story in the game world.
57.0	Understand the principles of Sprite animation as it relates to 2D game graphics (walk, run, Jump, idle). – The student will be able to:
57.01	Demonstrate the ability to create character and object views from which to animate.
57.02	Break down animation into a series of pictures to import animation to a game engine.
57.03	Demonstrate the effective use of animation loops and cycles in a game engine.
57.04	Demonstrate an understanding of the value of timing to convey character motion.
57.05	Demonstrate the effective use of animation arcs for the articulation of body elements.
57.06	Demonstrate the use of principles of animation such as anticipation, squash, stretch, weight, exaggeration and overlapping & secondary motion.
58.0	Facial animation, expressions, and audio lip syncing. – The student will be able to:
58.01	Know the basics of lip syncing.
58.02	Understand facial land marking.
58.03	Demonstrate the ability to show emotions thru the eyes.
59.0	Create graphics for the user interface such as titles and button states. – The student will be able to:
59.01	Understanding good menu flow of the user interface.
59.02	Designing the ideal HUD (Heads Up Display).
59.03	Wisely use text in the game interface.
59.04	Demonstrate the ability to creating Mock-Ups.
60.0	Effects design and other in-game effects. – The student will be able to:
60.01	Understand particle design for fire and smoke.
60.02	Create water spray using 2D particles.
60.03	Know the anatomy of an explosion effect.
60.04	Create a 3D feel in a 2D world using light and shadows.

61.0	Demonstrate the effective use of art input devices. – The student will be able to:
	61.01 Demonstrate the installation, software and hardware associated with digital tablets, scanners, and a digital camera.
	61.02 Demonstrate the use of a digital tablet within a paint software application.
	61.03 Demonstrate the process of capturing textures using a digital camera.
	61.04 Demonstrate the process of importing images from a digital camera into a photo editing software application.
	61.05 Demonstrate the proper use of a scanner for image processing.
62.0	Demonstrate leadership and teamwork skills needed, as it relates to game/simulation development, to accomplish team goals and objectives. – The student will be able to:
	62.01 Employ leadership skills to accomplish organizational goals and objectives.
	62.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	62.03 Conduct and participate in meetings to accomplish work tasks.
	62.04 Employ mentoring skills to inspire and teach others.
63.0	Explain the importance of employability skill and entrepreneurship skills as they relate to game/simulation development. – The student will be able to:
	63.01 Identify and demonstrate positive work behaviors needed to be employable.
	63.02 Develop personal career plan that includes goals, objectives, and strategies.
	63.03 Examine licensing, certification, and industry credentialing requirements.
	63.04 Maintain a career portfolio to document knowledge, skills, and experience.
	63.05 Evaluate and compare employment opportunities that match career goals.
	63.06 Identify and exhibit traits for retaining employment.
	63.07 Identify opportunities and research requirements for career advancement.
	63.08 Research the benefits of ongoing professional development.
	63.09 Examine and describe entrepreneurship opportunities as a career planning option.

64.0	Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 2D game graphics. – The student will be able to:
64.01	Identify styles of art and trends such as surrealism, pop art, and expressionism by viewing reproductions, prints, videos, periodicals, books or Internet sites.
64.02	Identify art styles from various historical periods.
64.03	Use concise vocabulary to compare and contrast artistic elements and design principles in personal works and the works of others.
64.04	Explore the details in works noting the use of materials, lighting and features that contribute to the overall feel and mood of the work.
65.0	Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets. – The student will be able to:
65.01	Understand the use of “Fair use and Fair Dealing”.
65.02	Understand the transfer and licensing of creative works.
65.03	Understand the use of “exclusive rights” to intellectual creations.
65.04	Demonstrate the use of digital watermarking.
66.0	Understand the various job titles and responsibilities of a 2D artist as it relates to the game industry. – The student will be able to:
66.01	Identify the job titles of visual artist used in a 2D game project.

Course Number: DIG0072 **Occupational Completion Point: C** **Game/Simulation 3D Animator – 150 Hours – SOC Code 27-1014**	
67.0	Understand the significance of historical and cultural heritage of art and artistic styles as it relates to 3D game graphics. – The student will be able to:
67.01	Identify styles of art and trends such as surrealism, pop art, and expressionism by viewing reproductions, prints, videos, periodicals, books or Internet sites.
67.02	Identify art styles from various historical periods.
67.03	Use concise vocabulary to compare and contrast artistic elements and design principles in personal works and the works of others.
67.04	Explore the details in works noting the use of materials, lighting and features that contribute to the overall feel and mood of the work.
68.0	Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets. – The student will be able to:
68.01	Understand the use of “Fair use and Fair Dealing”.
68.02	Understand the transfer and licensing of creative works.
68.03	Understand the use of “exclusive rights” to intellectual creations.
68.04	Demonstrate the use of digital watermarking.
69.0	Understand the various job titles and responsibilities of a 3D artist as it relates to the game industry. – The student will be able to:
69.01	Identify the job titles of visual artist used in a 3D game project.
69.02	Demonstrate the ability to work as part of an art team.
69.03	Perform the role of the concept artist for a 3D game project.
69.04	Perform the role of the art director for a 3D game project.
69.05	Perform the role of the texture artist for a 3D game project.
69.06	Perform the role of the environment artist for a 3D game project.
70.0	Develop the art direction for a 3D game. – The student will be able to:
70.01	Develop a vision for visual elements of a 3D game.
70.02	Effectively convey the mood or psychological appeal of the game to the target audience through the use of visual styles.
70.03	Create conceptual game art using various techniques, emphasizing space and form through range of value, placement, reflections, and shadows.

	70.04 Create character sketches, architectural sketches and background sketches for the concept artist to render from.
	70.05 Develop the game design documents, including schedules and technical specifications for the art team.
	70.06 Understand the challenges of art direction as it relates to mobile devices.
71.0	Determine and document the graphical and animation needs of a game using design documents including art direction and reference materials. – The student will be able to:
	71.01 Understand the design requirements and limitations of a 3D game engine.
	71.02 Develop characters and game elements in respect to the art direction laid out in the design documents.
	71.03 Determine the appropriate file format as it applies to pixel based graphics, which are resolution dependent.
	71.04 Understand the different aspects of quality and detail in relation to performance and size.
	71.05 Understand the role of naming conventions as it applies to creative assets storage used in the work flow.
	71.06 Demonstrate the effective use of alternative resolutions, scaling and file formats.
72.0	Understand the fundamentals of drawing and painting techniques. – The student will be able to:
	72.01 Demonstrate the use (traditional or digital) of inks, watercolors, acrylics, oils, and mixed media in a 3D game.
	72.02 Demonstrate the use of different techniques, format, media or style.
	72.03 Understand the use of primitives.
	72.04 Demonstrate basic understanding of composition of a scene.
	72.05 Understand the shape of the human form.
	72.06 Know the value of lights and shadows.
73.0	Demonstrate a working knowledge of modeling and paint programs used to make 3D graphics and animation. – The student will be able to:
	73.01 Understand the limitation of bitmaps images.
	73.02 Understand the use and application of bump map, normal and displacement images applied to a model.
	73.03 Demonstrate understanding of various digital content creation tools.
	73.04 Utilize the programs tools and brushes.
	73.05 Know the importance of layers.
	73.06 Identify file formats.

74.0	3D world building, making graphics and backgrounds for 3D side scrolling, top down, and Isometric projection. – The student will be able to:
74.01	Know the importance of scale in relation to the player.
74.02	Understand 3D level design to successfully lead the player.
74.03	Effectively use 3D graphics to convey mood and story in the game world.
75.0	Understand the principles of Sprite animation as it relates to 3D game graphics (walk, run, Jump, idle). – The student will be able to:
75.01	Demonstrate the ability to create character and object views from which to animate.
75.02	Break down animation into a series of pictures.
75.03	Demonstrate the effective use of animation loops and cycles in a game engine.
75.04	Demonstrate an understanding of the value of timing to convey character motion.
75.05	Demonstrate the effective use of animation arcs for the articulation of body elements.
75.06	Demonstrate the use of principles of animation such as anticipation, squash, stretch, weight, exaggeration and overlapping & secondary motion.
75.07	Understand the use of motion capture techniques and acting principles.
76.0	Facial animation, expressions, and audio lip syncing. – The student will be able to:
76.01	Know the basics of lip syncing.
76.02	Understand facial land marking.
76.03	Demonstrate the ability to show emotions thru the eyes.
76.04	Demonstrate the use of motion capture data as it applies to facial animation.
77.0	Create graphics for the user interface including titles and button states. – The student will be able to:
77.01	Understanding good menu flow of the user interface.
77.02	Designing the ideal HUD (Heads Up Display).
77.03	Wisely using text in the game interface.
77.04	Demonstrate the ability for creating Mock-Ups.
78.0	Particle system design and other in-game effects such as lighting and shadows. – The student will be able to:
78.01	Understand particle design for fire and smoke.
78.02	Create water spray using 3D particles.

78.03	Know the aspects of an explosion effect.
78.04	Create a photorealistic or artistic style in a 3D world using light, shadows, bump maps, and textures.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 10, and Reading 10. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Game/Simulation/Animation Audio/Video Effects**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	B082200
CIP Number	0550041115
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @ 7 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other 27-1014 – Multimedia Artists and Animators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Game/Simulation Designer, Digital Media Artist, and Digital Media Specialist in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to practical experiences in game/simulation conceptualization, design, storyboarding, development methodologies, audio/sound effects design and production, video/special effects design and production, and implementation issues. Specialized skills involving audio and video editing equipment and software are used to produce a variety of intrinsic and special audio/video effects.

This program is project-based and focuses on broad, transferable skills and stresses understanding and demonstration of the following rudiments of the game and simulation industry: production planning, elements of production design, storyboarding, elements of visual design, integration of digital audio and digital video into new game/simulation productions, and collaboration/teamwork.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	DIG0070	Game/Simulation Designer	300 hours	15-1199
B	DIG0073	Digital Media Artist	150 hours	27-1014
C	DIG0074	Digital Media Specialist	150 hours	27-1014

*Note: OTA0040 is a highly recommended core.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game.
02.0 Use information technology tools.
03.0 Design and create a playable game.
04.0 Categorize the different gaming genres.
05.0 Categorize different gaming platforms.
06.0 Understand the historical significance of electronic and non-electronic games.
07.0 Describe the trends in current and future game development.
08.0 Identify the business model commonly used in game development industries.
09.0 Examine and categorize the significant processes in the production of games.
10.0 Understand the core tasks and challenges that face a video game design team.
11.0 Identify legal issues that affect games, developers and players.
12.0 Demonstrate the professional level of written and oral communication required in the game development industry.
13.0 Investigate career opportunities in the game industry.
14.0 Demonstrate an understanding of the vocabulary of the industry for discussing games and play.
15.0 Demonstrate research and information fluency.
16.0 Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design.
17.0 Identify popular games and identify commonality between them.
18.0 Understand the general procedure and requirements of game design.
19.0 Explore the methods used to create and sustain player immersion.
20.0 Become familiar with popular game tools such as DirectX, 3DMax, and different gaming engines.
21.0 Demonstrate language arts knowledge and skills.
22.0 Demonstrate mathematics knowledge and skills.
23.0 Demonstrate science knowledge and skills.
24.0 Create a working game or simulation individually or as part of a team.
25.0 Describe the game development life cycle.
26.0 Identify hardware constraints on video games including processors and I/O devices.
27.0 Understand the general principles of storytelling.
28.0 Understand character archetypes and character design.
29.0 Understand the use of storyboarding in game design.
30.0 Develop a game design document or cut.
31.0 Understand outlining in game designs.
32.0 Explore elements of puzzle design.
33.0 Discuss game designer strategy considerations.
34.0 Understand the process of creating and designing player choice.
35.0 Create and design the game flow as it relates to story and plot.
36.0 Assess common principles and procedures in game flow design.
37.0 Describe player challenge rule creation elements.

38.0 Identify tools and software commonly used in game development.
39.0 Understand the technical methodologies for integrating digital media into a game or simulation.
40.0 Identify commonly used art and animation production tools in the game design industry.
41.0 Understand the general concepts of environmental design.
42.0 Describe how environmental design is used in conjunction with game level design.
43.0 Describe pertinent issues facing game designers.
44.0 Describe Monte Carlo simulation as it relates to game design.
45.0 Understand the use of inventory systems in game design.
46.0 Use information technology tools.
47.0 Describe the roles within a game studio.
48.0 Describe the importance of professional ethics and legal responsibilities.
49.0 Understand the history of audio/sound effects in the entertainment industry.
50.0 Perform various job roles typical for an audio technician on a game/simulation project.
51.0 Understand intellectual property rights, copyright laws, and plagiarism as they apply to creative assets.
52.0 Demonstrate a knowledge of production writing as it relates to game and simulation design.
53.0 Demonstrate appropriate voice acting skills.
54.0 Demonstrate basic audio production.
55.0 Set-up and configure a computer for audio applications.
56.0 Operate an audio workstation.
57.0 Demonstrate application of MIDI in a game/simulation project.
58.0 Incorporate audio assets into game/simulation engine.
59.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
60.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
61.0 Explain the importance of employability skill and entrepreneurship skills.
62.0 Demonstrate personal money management concepts, procedures, and strategies.
63.0 Understand the history of video effects in the entertainment.
64.0 Understand the various job titles and responsibilities video technician as it relates to game and simulation design.
65.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets.
66.0 Demonstrate a knowledge of production writing as it relates to game and simulation design.
67.0 Demonstrate appropriate acting skills.
68.0 Demonstrate basic video production.
69.0 Demonstrate set-up and configuration of a computer for video applications.
70.0 Demonstrate the basic operation of a video workstation.
71.0 Incorporate video assets into game/simulation engine.

Florida Department of Education
Student Performance Standards

Program Title: **Game, Simulation & Animation Audio/Video Effects**
PSAV Number: **B082200**

Game & Simulation Creation

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

Course Number: DIG0070 **Occupational Completion Point: A** **Game/Simulation Designer – 300 Hours – SOC Code 27-1021**	
01.0	Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game. – The student will be able to:
01.01	Use industry standard game design production documents to create a game design production plan.
02.0	Use information technology tools. – The student will be able to:
02.01	Use personal information management (PIM) applications to increase workplace efficiency.
02.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
03.0	Design and create a playable game. – The student will be able to:
03.01	Use a number of computer tools to enhance and ease game programming and artistry.
03.02	Use a game engine to create a playable game.
03.03	Use animated objects.
03.04	Integrate sound and music to enhance the game experience.
03.05	Test and debug to game completion.
04.0	Categorize the different gaming genres. – The student will be able to:
04.01	Research, compare and categorize the different gaming genres.
04.02	Analyze examples of different gaming genres.
04.03	Define and use the necessary vocabulary related to gaming and the different genres.

05.0	Categorize different gaming platforms. – The student will be able to:
05.01	Research, compare and categorize different gaming platforms.
05.02	Analyze the distinctive features of each system.
05.03	Define the target audience for different platforms based on features, available games, and price of system and games.
05.04	Define and use the necessary vocabulary related to gaming platforms.
06.0	Understand the historical significance of electronic and non-electronic games. – The student will be able to:
06.01	Discuss the history of non-electronic games.
06.02	Describe the history and theory of mainstream and experimental media including radio, movies, television, art, and theatre.
06.03	Explain the historical timeline of electronic games, marking the significant highlights in their evolution.
07.0	Describe the trends in current and future game development. – The student will be able to:
07.01	Determine and analyze the significant trends in game development in the past two decades.
07.02	Research and brainstorm the possibilities for the future of electronic games based on current and emerging technologies and future predictions.
08.0	Identify the business model commonly used in game development industries. – The student will be able to:
08.01	Identify, define and discuss the different ways games are funded, marketed and sold.
08.02	Identify and describe licensing management for different gaming platforms.
08.03	Discuss the product value and business differences between major game platforms.
08.04	Identify successful business models and analyze various facets of those models, such as market analysis, marketing strategy, and product value.
08.05	Discuss the opportunities available to independent game developers and entrepreneurs in the mobile application market.
09.0	Examine and categorize the significant processes in the production of games. – The student will be able to:
09.01	Discuss the relationships between publishers, developers, distributors, marketers, and retailers.
09.02	Identify processes of development including content creation, team roles, design documentation, and process management.
09.03	Explore and describe the effects of globalization on the design and production of video games.

10.0	Understand the core tasks and challenges that face a video game design team. – The student will be able to:
10.01	Identify and define the roles and responsibilities of team members on a video game design team.
10.02	Describe the effects of group dynamics and the importance of team building for a design team.
10.03	Explore and discuss methods of communications and scheduling for design teams.
10.04	Describe the importance and interrelationship between development schedule and budget constraints in video game design.
11.0	Identify legal issues that affect games, developers and players. – The student will be able to:
11.01	Define and discuss intellectual property and contract law as it relates to the gaming industry.
11.02	Describe legal and liability issues that could affect online communities.
11.03	Compare and contrast government and industry content regulation and industry ratings of video games.
12.0	Demonstrate the professional level of written and oral communication required in the game development industry. – The student will be able to:
12.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.
12.02	Organize ideas and communicate oral and written messages appropriate for the game development industry environment.
12.03	Identify, define, and discuss terminology appropriate for both internal and external communications in the game development industry environment.
12.04	Compose electronic documents used to facilitate formal and informal communication in the game industry such as letters, reports, memos, emails, presentations, budgets, charts and calendars.
13.0	Investigate career opportunities in the game industry. – The student will be able to:
13.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.
13.02	Analyze job and career requirements and relate career interests to opportunities in the global economy.
13.03	Describe job requirements for a variety of occupations within the game development industry.
13.04	Identify current employment trends and career opportunities in the game industry.
13.05	Evaluate personal aptitude and skills to match specific employment opportunities.
13.06	Develop an educational plan to acquire the skills and requirements of a selected employment opportunity within the game industry.
14.0	Demonstrate an understanding of the vocabulary of the industry for discussing games and play. – The student will be able to:
14.01	Identify, define, and discuss professional game design and analysis terminology appropriate for internal and external communications in a game design environment.
14.02	Identify and define the vocabulary used by game players and online gaming communities.

15.0	Demonstrate research and information fluency. - The student will be able to:
	15.01 Locate, analyze, process, and organize data from multiple sources including the Internet.
	15.02 Play games to research and collect game play data.
	15.03 Evaluate, analyze and document game styles and playability.
	15.04 Determine the dramatic elements in games, including kinds of fun, player types and nonlinear storytelling.
16.0	Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow and game design. – The student will be able to:
	16.01 Test and analyze games to determine the quality of rules, interfaces, navigation, performance, play, artistry and longevity in design and structure.
	16.02 Research and evaluate the game analysis techniques used by the video game industry.
	16.03 Identify the key elements in a game and make intelligent judgments about whether the game succeeded or failed in its objectives.
	16.04 Evaluate professional reviews and write a critical analysis of a current video game.
17.0	Identify popular games and identify commonality between them. – The student will be able to:
	17.01 Analyze and deconstruct game environments and interactions.
	17.02 Compare and contrast the top selling video games in terms of player interaction, plot complexity, and reward.
	17.03 Categorize gameplay elements by player type (killer, talker, explorer and achiever).
18.0	Understand the general procedure and requirements of game design. – The student will be able to:
	18.01 Describe the design process from conception to production.
	18.02 Explain the iterative nature of game design through the different stages of design iterations including pre-alpha, alpha, beta, release candidate, going gold and support.
	18.03 Develop design plans, for example, character sketches, documentation and storyboards for proposed games.
19.0	Explore the methods used to create and sustain player immersion. – The student will be able to:
	19.01 Research and define the term “player immersion”.
	19.02 Explore and explain the factors that create player immersion in a game.
	19.03 Examine popular games and explain the methods each game uses to increase player immersion.

20.0	Become familiar with popular game technology such as DirectX, 3DMAX, and different gaming engines. – The student will be able to:
	20.01 Identify and discuss the popular game development tools currently used in the industry.
	20.02 Identify and discuss popular gaming engines.
	20.03 Research and analyze the uses for different game development tools.
21.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	21.01 Locate, comprehend and evaluate key elements of oral and written information.
	21.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	21.03 Present information formally and informally for specific purposes and audiences.
22.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	22.01 Demonstrate knowledge of arithmetic operations.
	22.02 Analyze and apply data and measurements to solve problems and interpret documents.
	22.03 Construct charts/tables/graphs using functions and data.
23.0	Demonstrate science knowledge and skills. – The student will be able to:
	23.01 Discuss the role of creativity in constructing scientific questions, methods and explanations.
	23.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.	
24.0	Create a working game or simulation individually or as part of a team. – The student will be able to:
	24.01 Create a storyboard describing the essential elements, plot, flow, and functions of the game/simulation.
	24.02 Create a design specification document to include interface and delivery choices, rules of play, navigation functionality, scoring, media choices, start and end of play, special features, and development team credits.
	24.03 Using a simple game development tool, create a game or simulation.
	24.04 Present the game or simulation.
25.0	Describe the game development life cycle. – The student will be able to:
	25.01 Identify steps in the pre-production process including the proof of concept and market research.
	25.02 Describe the iterative prototyping process – Alpha, Beta, RTM.
	25.03 Determine platform, technology and scripting requirements.
	25.04 Implement techniques of scenario development, levels, and missions.
	25.05 Discuss game testing requirements and methods.
	25.06 Identify and describe maintenance, upgrade and sequel issues.
26.0	Identify hardware constraints on video games including processors and I/O devices. – The student will be able to:
	26.01 Identify the different control systems for video games.
	26.02 Compare and contrast personal computer and video game console hardware, including display systems.
	26.03 Explain the factors that can limit the game-playing ability of personal computers.
27.0	Understand the general principles of storytelling. – The student will be able to:
	27.01 Identify the essential elements of a story.
	27.02 Describe how creative writing is used as a game design tool.
	27.03 Compare and contrast methods of delivering a story in a game.
28.0	Understand character archetypes and character design. – The student will be able to:
	28.01 Research and identify common character archetypes used in computer games.
	28.02 Design character prototypes to physically match archetype.

	28.03 Apply symbolize and semiotic design elements within character design to convey meaning.
	28.04 Create character backstory and profile.
29.0	Understand the use of storyboarding in game design. – The student will be able to:
	29.01 Assess the techniques used in the gaming industry for rendering basic Game Design Art.
	29.02 Describe how game layout charts are used in game design.
	29.03 Describe how storyboards in the game design process can be used as a pre-development sales tool.
	29.04 Analyze and compare the use of storyboards in the game design industry with regard to environmental illustrations, level designs, character designs, model sheets and GUI Designs.
30.0	Develop a game design document or cut. – The student will be able to:
	30.01 Evaluate and discuss the choice of delivery system.
	30.02 Evaluate and discuss choices of genre, game design software, art, digital media, and animation software.
	30.03 Create a game strategy overview, character overview, and storyboard overview.
	30.04 Define the rules of play and multi-player options.
	30.05 Create the layout and interfaces overview and digital media overview.
	30.06 Determine the gameplay interaction requirements and create the progression levels overview.
	30.07 Define strategic positioning of game immersion dynamics and psychological effect.
	30.08 Identify hardware and software constraints.
31.0	Understand outlining in game designs. – The student will be able to:
	31.01 Assess techniques of goal design in gaming.
	31.02 Describe the concept of nested victories.
	31.03 Discuss the use of players as agents of change.
	31.04 Compare and contrast examples of understandable context in gaming.
	31.05 Discuss the principles underlying the creation of understandable rules.
	31.06 Describe how skill building is used in game design.
	31.07 Describe conventional techniques of positive feedback.
	31.08 Discuss functional consistency as it relates to the use of interfaces.

32.0	Explore elements of puzzle design. – The student will be able to:
	32.01 Describe the essential elements of a puzzle.
	32.02 Identify the different types of puzzles.
	32.03 Describe the basic principles of high-level puzzle design.
	32.04 Describe the basic principles of low-level puzzle design.
33.0	Discuss game designer strategy considerations. – The student will be able to:
	33.01 Describe the use of artificial intelligence challenges in game design and the need for giving the player rest time between challenges.
	33.02 Evaluate the impact of randomness in game design especially as it pertains to pattern recognition.
	33.03 Identify techniques used in the industry to help the player to navigate.
	33.04 Explain the use of “just barely” victories and failures as an exciting and immersive technique.
	33.05 Assess techniques used to provide a range of challenges and appeal to a wide range of abilities.
	33.06 Describe the psychological cost of failure in games as it pertains to immersion and psychological effect.
	33.07 Identify methods of preparing the player for greater challenge while allowing for plot development as the story serves the game.
34.0	Understand the process of creating and designing player choice. – The student will be able to:
	34.01 Discuss the principles of player-centric design.
	34.02 Research and correlate game complexity level to appropriate age group such that content matches user skill set required.
	34.03 Examine and discuss design elements that encourage continuous active engagement both mental and physical.
	34.04 Analyze design elements that maintain player interest and vary the degree of challenge.
	34.05 Discuss the need for a balance of design elements for the purpose of rewarding and frustrating players.
35.0	Create and design the game flow as it relates to story and plot. – The student will be able to:
	35.01 Identify techniques of introducing the story plot and beginning play.
	35.02 Describe story plot development techniques for the middle of play in game design.
	35.03 Analyze and discuss planning techniques for climax and finale of games.

36.0	Assess common principles and procedures in game flow design. – The student will be able to:
	36.01 Assess missions and scenarios game flow techniques.
	36.02 Describe common use of mission design and campaigns.
	36.03 Evaluate usage of static versus dynamic campaigns.
37.0	Describe player challenge rule creation elements. – The student will be able to:
	37.01 Research common design methods for clearing obstacles or series of obstacles.
	37.02 Describe common design elements introducing skill, luck and combinations including escalating challenges to games.
	37.03 Identify common design elements used to vary weapons, characters and tools.
	37.04 Discuss the incorporation of risk reward and adaptive challenges (AI).
	37.05 Evaluate industry use of boss encounters in games.
	37.06 Analyze and discuss design considerations from the perspective of other players and multi-player environments.
38.0	Identify tools and software commonly used in game development. – The student will be able to:
	38.01 Identify and discuss the popular game development tools currently used in the industry.
	38.02 Identify and discuss popular gaming engines.
	38.03 Identify and discuss popular world building tools.
39.0	Understand the technical methodologies for integrating digital media into a game or simulation. – The student will be able to:
	39.01 Survey and discuss the use of naming conventions and temp sounds.
	39.02 Analyze and discuss methods of matching sound effects to art assets.
	39.03 Identify and categorize commonly used technology sound engine integration equipment.
	39.04 Identify and discuss resources such as sound effects libraries.
	39.05 Examine methods of sound implementation and associated software.
	39.06 Describe how and why digital video may be integrated into a game or simulation design.
	39.07 Describe how special effects differ from animation.

40.0	Identify commonly used art and animation production tools in the game design industry. – The student will be able to:
40.01	Identify, categorize and discuss art and animation tools commonly used in game design.
41.0	Understand the general concepts of environmental design. – The student will be able to:
41.01	Survey and evaluate commonly used concept art.
41.02	Create a world sketch with particular attention to maintaining continuity of style.
41.03	Describe the emotional/psychological aspects of environmental design that signify mood, façade of freedom, and resource struggling.
42.0	Describe how environmental design is used in conjunction with game level design. – The student will be able to:
42.01	Examine and evaluate examples of focus on a theme.
42.02	Describe methods of creating a purposeful architecture giving consideration to continuity and themes and taking advantage of revisiting.
42.03	Consider and discuss environmental design elements for multi-player or single player games.
42.04	Describe the history of creating shifts in game design environments and embracing novel ideas.
42.05	Identify and discuss environmental design pitfalls such as red herrings and cookie-cutter layouts.
43.0	Describe pertinent issues facing game designers. – The student will be able to:
43.01	Discuss the meaning of simulation and give examples of simulation and complexity including architecture, exposure, concealment and heuristics.
43.02	Describe applied event modeling including goal discovery, map making, event exploration, developing incentives and learning in event modeling for games.
43.03	Explain the concepts of modes of understanding, inductive and iconic logic, significance and saturation in event modeling for game design.
44.0	Describe Monte Carlo simulation as it relates to game design. – The student will be able to:
44.01	Discuss the process of specifying events including contexts of simulation, translating event models to simulations, formalizing thematic objectives, prototyping, interface design and use cases with modeling.
44.02	Discuss the process of designing entities including behavior and entity graphics.
44.03	Describe the implementation of entities including enumerating animations, playing with time, creating events, adding an entity class, and creating entity events and behaviors.
44.04	Analyze event modeling in creating a world including the creation of a world class, adding and removing entities, accessing entities, updating and rendering, adding scene hierarchies and handling world events.
44.05	Assess and discuss AI and physics issues for simulation including AI event contexts, adding intelligence and gravity, adding collision detection, updating for collisions and applying mass and force.
44.06	Discuss environmental elements of simulation including logic, cognitive saturation, systems and interpretation, context of reality, shadows and lighting.

	44.07	Discuss the simulation of physical systems such as trees and forests and related events such as fires, or insect swarms such as beehives, bird flocks or anthills.
	44.08	Describe the simulation of social and economic systems including practical applications, historical precedents, modeling for community events, creation of communities including structures, states events and rendering and altering building states, population behaviors, and controlling influences.
	44.09	Describe the process of testing simulations and event models including effectiveness, diagrammatic systems evaluation, context influence, path transitions and assessing messages.
45.0	Understand the use of inventory systems in game design. – The student will be able to:	
	45.01	Discuss the various methods of describing items in player's inventory in contemporary game design.
	45.02	Review and discuss industry methods of communicating how inventory items can have an effect on game play.
46.0	Use information technology tools. – The student will be able to:	
	46.01	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	46.02	Employ computer operations applications to access, create, manage, integrate, and store information.
	46.03	Employ collaborative/groupware applications to facilitate group work.
47.0	Describe the roles within a game studio. – The student will be able to:	
	47.01	Describe the nature and types of business organizations.
	47.02	Explain the effect of key organizational systems on performance and quality.
	47.03	List and describe quality control systems and/or practices common to the workplace.
	47.04	Explain the impact of the global economy on business organizations.
48.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:	
	48.01	Evaluate and justify decisions based on ethical reasoning.
	48.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	48.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	48.04	Interpret and explain written organizational policies and procedures.

Course Number: DIG0073 **Occupational Completion Point: B** **Digital Media Artist – 150 Hours – SOC Code 27-1014**
49.0 Understand the history of audio/sound effects in the entertainment industry. – The student will be able to:
49.01 Discuss the role of sound in a visual presentation.
49.02 Describe how audio/sound effects can establish or reinforce the mood.
49.03 Explain the importance of production value.
49.04 Describe the evolution of audio/sound effects production.
49.05 Identify the technology incorporated into the production of sound.
50.0 Perform various job roles typical for an audio technician on a game/ simulation project. – The student will be able to:
50.01 Identify the job titles of audio technicians and artists typically involved in a game project.
50.02 Work as part of a sound design team.
50.03 Perform the role of the sound designer for a game/simulation project.
50.04 Perform the role of music supervisor for a game/simulation project.
50.05 Perform the role of Foley artist for a game/simulation project.
50.06 Perform the role of voice actor for a game/simulation project.
50.07 Perform the role of recording engineer for a game/simulation project.
50.08 Perform the role of sound editor for a game/simulation project.
50.09 Perform the role of composer/arranger for a game/simulation project.
51.0 Understand intellectual property rights, copyright laws, and plagiarism as they apply to creative assets. – The student will be able to:
51.01 Compare and contrast the doctrines of fair use and fair dealing.
51.02 Describe the transfer and licensing of creative works.
51.03 Explain the use of “exclusive rights” to intellectual creations.
51.04 Use digital watermarking to embed copyright information in an audio file.

52.0	Demonstrate a knowledge of production writing as it relates to game and simulation design. – The student will be able to:
52.01	Explain the job of a scriptwriter and outline the elements of a script.
52.02	Breakdown a script into audio production elements.
52.03	Write simple dialog.
52.04	Translate script elements into lyrics for a theme song.
52.05	Write narration or instructions for game/simulation.
53.0	Demonstrate appropriate voice acting skills. – The student will be able to:
53.01	Read aloud in a professional manner.
53.02	Receive and properly act upon direction given by the producer/director.
53.03	Understand the concept of voice acting and playing a role while speaking.
53.04	Perform various voice acting assignments in a professional manner according to industry standards.
54.0	Demonstrate basic audio production. – The student will be able to:
54.01	Describe digital audio storage concepts and digital storage media.
54.02	Operate digital recording decks and other digital storage devices.
54.03	Describe the function and operation of digital audio workstations.
54.04	Edit, cut, erase, and insert sound utilizing various digital production techniques.
54.05	Perform digital noise reduction and noise extraction via spectral display.
55.0	Set-up and configure a computer for audio applications. – The student will be able to:
55.01	Install basic peripheral devices related to audio programs.
55.02	Install and configure software related to audio programs.
55.03	Demonstrate basic knowledge of computer system requirements.
55.04	Install plug-ins or additional audio source material such as beats and or samples.
55.05	Diagram the signal flow of a digital audio workstation.

56.0	Operate an audio workstation. – The student will be able to:
56.01	Demonstrate knowledge of the digital audio workstation interface.
56.02	Create and arrange a multi-track project.
56.03	Create interest and effect using editing techniques.
56.04	Design and edit audio using a waveform editor.
56.05	Record audio directly to the digital audio workstation.
56.06	Mix audio.
56.07	Demonstrate skill in using audio effects and plug-ins.
56.08	Prepare an audio project for finishing and final mix down.
56.09	Transfer audio files between various audio software applications.
56.10	Demonstrate the understanding of audio file bit depth, bandwidth and dithering and be able to explain when and where these apply in various applications of digital audio production.
56.11	Export finished audio.
57.0	Demonstrate application of MIDI in a game/simulation project. – The student will be able to:
57.01	Demonstrate an understanding of MIDI.
57.02	Discuss the advantage and use of MIDI in a game/simulation.
57.03	Discuss the limitations of MIDI.
57.04	Utilize a computer and multiple MIDI instruments.
57.05	Record a single sound track; add multiple sound tracks, and change MIDI voices using the software.
57.06	Export a MIDI soundtrack for use in a game/simulation.
57.07	Export a MIDI sound effect for use in a game/simulation.
57.08	Apply MIDI file to an object or game/simulation element.
58.0	Incorporate audio assets into game/simulation engine. – The student will be able to:
58.01	Describe the audio effects workflow.
58.02	Explain audio codecs and formats used in game/simulation engines.

	58.03 Import audio into the game/simulation engine.
	58.04 Use appropriate naming conventions for audio assets.
	58.05 Describe the use of 3D and surround sound.
	58.06 Apply knowledge of distance/spatial effects including surround sound in a game/simulation.
	58.07 Contrast the audio environment as it relates to the visual environment.
59.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	59.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	59.02 Explain emergency procedures to follow in response to workplace accidents.
	59.03 Create a disaster and/or emergency response plan.
60.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	60.01 Employ leadership skills to accomplish organizational goals and objectives.
	60.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	60.03 Conduct and participate in meetings to accomplish work tasks.
	60.04 Employ mentoring skills to inspire and teach others.
61.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	61.01 Identify and demonstrate positive work behaviors needed to be employable.
	61.02 Develop personal career plan that includes goals, objectives, and strategies.
	61.03 Examine licensing, certification, and industry credentialing requirements.
	61.04 Maintain a career portfolio to document knowledge, skills, and experience.
	61.05 Evaluate and compare employment opportunities that match career goals.
	61.06 Identify and exhibit traits for retaining employment.
	61.07 Identify opportunities and research requirements for career advancement.
	61.08 Research the benefits of ongoing professional development.
	61.09 Examine and describe entrepreneurship opportunities as a career planning option.

62.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:
	62.01 Identify and describe the services and legal responsibilities of financial institutions.
	62.02 Describe the effect of money management on personal and career goals.
	62.03 Develop a personal budget and financial goals.
	62.04 Complete financial instruments for making deposits and withdrawals.
	62.05 Maintain financial records.
	62.06 Read and reconcile financial statements.
	62.07 Research, compare and contrast investment opportunities.

Course Number: DIG0074 **Occupational Completion Point: C** **Digital Media Specialist – 150 Hours – SOC Code 27-1014**
63.0 Understand the history of video effects in the entertainment. – The student will be able to:
63.01 Understand the role of video in a visual presentation.
63.02 Understand how video effects can establish or reinforce the mood.
63.03 Understand the importance of production value.
63.04 Understand the history of video effects production.
63.05 Understand the technology incorporated into the production video and video effects.
64.0 Understand the various job titles and responsibilities video technician as it relates to game and simulation design. – The student will be able to:
64.01 Identify the job titles of video technicians and artist game project.
64.02 Demonstrate the ability to work as part of a video production team.
64.03 Perform the role of the video technical director for a game/simulation project.
64.04 Perform the role of video editor for a game/simulation project.
64.05 Perform the role of camera operator for a game/simulation project.
64.06 Perform the role of special effects coordinator for a game/simulation project.
64.07 Perform the role of video recording operator for a game/simulation project.
64.08 Perform the role of video effects artist for a game/simulation project.
64.09 Perform the role of compositor for a game/simulation project.
65.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets. – The student will be able to:
65.01 Understand the use of “Fair use and Fair Dealing”.
65.02 Understand the transfer and licensing of creative works.
65.03 Understand the use of “exclusive rights” to intellectual creations.
65.04 Demonstrate the use of digital watermarking.

66.0	Demonstrate a knowledge of production writing as it relates to game and simulation design. – The student will be able to:
66.01	Explain the job of a scriptwriter and outline the elements of a script.
66.02	Demonstrate ability to breakdown a script into video production elements.
66.03	Demonstrate ability to write simple dialog.
66.04	Demonstrate ability to translate script elements into production schedule.
66.05	Demonstrate ability to write narration or instructions for game/simulation.
67.0	Demonstrate appropriate acting skills. – The student will be able to:
67.01	Demonstrate the ability to read aloud in a professional manner.
67.02	Demonstrate the ability to receive and properly act upon direction given by the producer/director.
67.03	Understand the concept of acting and playing a role while speaking.
67.04	Perform the various assignments in a professional manner according to industry standards.
68.0	Demonstrate basic video production. – The student will be able to:
68.01	Use current industry standard production video equipment.
68.02	Operate camera in studio and location (field) production environments.
68.03	Demonstrate understanding of digital video storage concepts and digital storage media.
68.04	Demonstrate knowledge of and the ability to operate digital recording decks, and other digital storage devices.
68.05	Identify and select microphones for production needs.
68.06	Determine appropriate lighting needs for production settings.
68.07	Identify location and studio lighting types, method of use and application.
69.0	Demonstrate set-up and configuration of a computer for video applications. – The student will be able to:
69.01	Install basic peripheral devices related to video programs.
69.02	Install and configure software related to video programs.
69.03	Demonstrate basic knowledge of computer system requirements.
69.04	Demonstrate basic knowledge of installing plug-ins or additional audio source material such as beats and or samples.
69.05	Understand the signal flow of a digital video workstation.

70.0	Demonstrate the basic operation of a video workstation. – The student will be able to:
70.01	Demonstrate knowledge of the digital video workstation interface.
70.02	Demonstrate a working familiarity and understanding of the function and operation of digital video workstations.
70.03	Demonstrate ability to edit, cut, erase, and insert video utilizing various digital production techniques.
70.04	Record video directly to the digital video workstation.
70.05	Demonstrate knowledge of editing video according to message.
70.06	Demonstrate skill in using video effects and plug-ins.
70.07	Prepare a video project for final compositing and export.
70.08	Transfer video files between various video software applications.
70.09	Export finished video.
71.0	Incorporate video assets into game/simulation engine. – The student will be able to:
71.01	Demonstrate knowledge of the video effects workflow.
71.02	Demonstrate knowledge of video codecs and formats used in game/simulation engines.
71.03	Demonstrate knowledge and ability to import video into the game/simulation engine.
71.04	Use appropriate naming conventions for video assets.
71.05	Understand the use of placing video assets into a 3D environment.
71.06	Demonstrate knowledge of distance/spatial video effects in relation to sound effects in a game/simulation.
71.07	Understand the audio environment as it relates to the visual environment.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 10, and Reading 10. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Game/Simulation/Animation Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	B082300
CIP Number	0550041116
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @7 7G COMP PROG 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Game/Simulation Designer, Game Programmer, and Game Software Developer in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to practical experiences in game/simulation conceptualization, design, storyboarding, development methodologies, essential programming techniques, and implementation issues. Specialized programming skills involving advanced mathematical calculations and physics are also integrated into the curriculum.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIG0070	Game/Simulation Designer	300 hours	15-1199
B	DIG0075	Game/Simulation Programmer	150 hours	15-1131
C	DIG0076	Game/Simulation Software Developer	150 hours	15-1131

Note: OTA0040 is a highly recommended core.

Program Recommendations

This program is project-based and focuses on broad, transferable skills and stresses understanding and demonstration of the following rudiments of the game and simulation industry: production planning, elements of production design, storyboarding, elements of visual design, integration of digital audio and digital video into new game/simulation productions, programming for single and multi-user environments, delivery systems, and collaboration/teamwork.

The Foundations and Design courses should be taken in sequence prior to the Programming and Multi-User Programming courses. The Programming and Multi-User Programming courses may be taken concurrently. It is highly recommended that students complete a programming course prior to taking the last two courses of this program.

This program emphasizes the development of technical abilities as well as ethical and societal awareness necessary to function in a highly technological society. The use of cooperative learning groups is recommended. By learning and practicing group process skills, students will be prepared to work "together" in real work situations. Program graduates will develop enhanced self-esteem as well as the problem solving and teamwork skills necessary to succeed in careers.

The Game/Simulation/Animation Programming program places a strong emphasis on workplace learning. Job shadowing and mentoring experiences with game and simulation professionals along with on-site trips to local businesses connect classroom learning to the workplace. In-class guest speakers bring the real world into the classroom.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game.
02.0 Use information technology tools.
03.0 Design and create a playable game.
04.0 Categorize the different gaming genres.
05.0 Categorize different gaming platforms.
06.0 Understand the historical significance of electronic and non-electronic games.
07.0 Describe the trends in current and future game development.
08.0 Identify the business model commonly used in game development industries.
09.0 Examine and categorize the significant processes in the production of games.
10.0 Understand the core tasks and challenges that face a video game design team.
11.0 Identify legal issues that affect games, developers and players.
12.0 Demonstrate the professional level of written and oral communication required in the game development industry.
13.0 Investigate career opportunities in the game industry.
14.0 Demonstrate an understanding of the vocabulary of the industry for discussing games and play.
15.0 Demonstrate research and information fluency.
16.0 Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design.
17.0 Identify popular games and identify commonality between them.
18.0 Understand the general procedure and requirements of game design.
19.0 Explore the methods used to create and sustain player immersion.
20.0 Become familiar with popular game tools such as DirectX, 3DMax, and different gaming engines.
21.0 Demonstrate language arts knowledge and skills.
22.0 Demonstrate mathematics knowledge and skills.
23.0 Demonstrate science knowledge and skills.
24.0 Create a working game or simulation individually or as part of a team.
25.0 Describe the game development life cycle.
26.0 Identify hardware constraints on video games including processors and I/O devices.
27.0 Understand the general principles of storytelling.
28.0 Understand character archetypes and character design.
29.0 Understand the use of storyboarding in game design.
30.0 Develop a game design document or cut.
31.0 Understand outlining in game designs.
32.0 Explore elements of puzzle design.
33.0 Discuss game designer strategy considerations.
34.0 Understand the process of creating and designing player choice.
35.0 Create and design the game flow as it relates to story and plot.
36.0 Assess common principles and procedures in game flow design.
37.0 Describe player challenge rule creation elements.
38.0 Identify tools and software commonly used in game development.

39.0 Understand the technical methodologies for integrating digital media into a game or simulation.
40.0 Identify commonly used art and animation production tools in the game design industry.
41.0 Understand the general concepts of environmental design.
42.0 Describe how environmental design is used in conjunction with game level design.
43.0 Describe pertinent issues facing game designers.
44.0 Describe Monte Carlo simulation as it relates to game design.
45.0 Understand the use of inventory systems in game design.
46.0 Use information technology tools.
47.0 Describe the roles within a game studio.
48.0 Describe the importance of professional ethics and legal responsibilities.
49.0 Identify functions of information processing.
50.0 Test programs.
51.0 Plan program design.
52.0 Code programs.
53.0 Perform program maintenance.
54.0 Create and maintain documentation.
55.0 Evaluate assigned game programming tasks.
56.0 Implement enhanced program structures.
57.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
58.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
59.0 Explain the importance of employability skill and entrepreneurship skills.
60.0 Demonstrate personal money-management concepts, procedures, and strategies.
61.0 Identify and describe basic network terminology and network security.
62.0 Game configuration.
63.0 Test programs.
64.0 Plan program design.
65.0 Create and maintain documentation.
66.0 Code programs.
67.0 Demonstrate an understanding of operating systems, environments, and platforms.
68.0 Implement enhanced program structures.
69.0 Implement multimedia programming.
70.0 Develop an understanding of programming techniques and concepts.

Florida Department of Education
Student Performance Standards

Program Title: **Game/Simulation/Animation Programming**
PSAV Number: **B082300**

Course Number: DIG0070 **Occupational Completion Point: A** **Game/Simulation Designer – 300 Hours – SOC Code 15-1199**	
01.0	Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game. – The student will be able to:
01.01	Use industry standard game design production documents to create a game design production plan.
02.0	Use information technology tools. – The student will be able to:
02.01	Use personal information management (PIM) applications to increase workplace efficiency.
02.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
03.0	Design and create a playable game. – The student will be able to:
03.01	Use a number of computer tools to enhance and ease game programming and artistry.
03.02	Use a game engine to create a playable game.
03.03	Use animated objects.
03.04	Integrate sound and music to enhance the game experience.
03.05	Test and debug to game completion.
04.0	Categorize the different gaming genres. – The student will be able to:
04.01	Research, compare and categorize the different gaming genres.
04.02	Analyze examples of different gaming genres.
04.03	Define and use the necessary vocabulary related to gaming and the different genres.
05.0	Categorize different gaming platforms. – The student will be able to:
05.01	Research, compare and categorize different gaming platforms.
05.02	Analyze the distinctive features of each system.

05.03	Define the target audience for different platforms based on features, available games, and price of system and games.
05.04	Define and use the necessary vocabulary related to gaming platforms.
06.0	Understand the historical significance of electronic and non-electronic games. – The student will be able to:
06.01	Discuss the history of non-electronic games.
06.02	Describe the history and theory of mainstream and experimental media including radio, movies, television, art, and theatre.
06.03	Explain the historical timeline of electronic games, marking the significant highlights in their evolution.
07.0	Describe the trends in current and future game development. – The student will be able to:
07.01	Determine and analyze the significant trends in game development in the past two decades.
07.02	Research and brainstorm the possibilities for the future of electronic games based on current and emerging technologies and future predictions.
08.0	Identify the business model commonly used in game development industries. – The student will be able to:
08.01	Identify, define and discuss the different ways games are funded, marketed and sold.
08.02	Identify and describe licensing management for different gaming platforms.
08.03	Discuss the product value and business differences between major game platforms.
08.04	Identify successful business models and analyze various facets of those models, such as market analysis, marketing strategy, and product value.
08.05	Discuss the opportunities available to independent game developers and entrepreneurs in the mobile application market.
09.0	Examine and categorize the significant processes in the production of games. – The student will be able to:
09.01	Discuss the relationships between publishers, developers, distributors, marketers, and retailers.
09.02	Identify processes of development including content creation, team roles, design documentation, and process management.
09.03	Explore and describe the effects of globalization on the design and production of video games.
10.0	Understand the core tasks and challenges that face a video game design team. – The student will be able to:
10.01	Identify and define the roles and responsibilities of team members on a video game design team.
10.02	Describe the effects of group dynamics and the importance of team building for a design team.
10.03	Explore and discuss methods of communications and scheduling for design teams.
10.04	Describe the importance and interrelationship between development schedule and budget constraints in video game design.

11.0	Identify legal issues that affect games, developers and players. – The student will be able to:
11.01	Define and discuss intellectual property and contract law as it relates to the gaming industry.
11.02	Describe legal and liability issues that could affect online communities.
11.03	Compare and contrast government and industry content regulation and industry ratings of video games.
12.0	Demonstrate the professional level of written and oral communication required in the game development industry. – The student will be able to:
12.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.
12.02	Organize ideas and communicate oral and written messages appropriate for the game development industry environment.
12.03	Identify, define, and discuss terminology appropriate for both internal and external communications in the game development industry environment.
12.04	Compose electronic documents used to facilitate formal and informal communication in the game industry such as letters, reports, memos, emails, presentations, budgets, charts and calendars.
13.0	Investigate career opportunities in the game industry. – The student will be able to:
13.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.
13.02	Analyze job and career requirements and relate career interests to opportunities in the global economy.
13.03	Describe job requirements for a variety of occupations within the game development industry.
13.04	Identify current employment trends and career opportunities in the game industry.
13.05	Evaluate personal aptitude and skills to match specific employment opportunities.
13.06	Develop an educational plan to acquire the skills and requirements of a selected employment opportunity within the game industry.
14.0	Demonstrate an understanding of the vocabulary of the industry for discussing games and play. – The student will be able to:
14.01	Identify, define, and discuss professional game design and analysis terminology appropriate for internal and external communications in a game design environment.
14.02	Identify and define the vocabulary used by game players and online gaming communities.
15.0	Demonstrate research and information fluency. - The student will be able to:
15.01	Locate, analyze, process, and organize data from multiple sources including the Internet.
15.02	Play games to research and collect game play data.
15.03	Evaluate, analyze and document game styles and playability.
15.04	Determine the dramatic elements in games, including kinds of fun, player types and nonlinear storytelling.

16.0	Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow and game design. – The student will be able to:
16.01	Test and analyze games to determine the quality of rules, interfaces, navigation, performance, play, artistry and longevity in design and structure.
16.02	Research and evaluate the game analysis techniques used by the video game industry.
16.03	Identify the key elements in a game and make intelligent judgments about whether the game succeeded or failed in its objectives.
16.04	Evaluate professional reviews and write a critical analysis of a current video game.
17.0	Identify popular games and identify commonality between them. – The student will be able to:
17.01	Analyze and deconstruct game environments and interactions.
17.02	Compare and contrast the top selling video games in terms of player interaction, plot complexity, and reward.
17.03	Categorize gameplay elements by player type (killer, talker, explorer and achiever).
18.0	Understand the general procedure and requirements of game design. – The student will be able to:
18.01	Describe the design process from conception to production.
18.02	Explain the iterative nature of game design through the different stages of design iterations including pre-alpha, alpha, beta, release candidate, going gold and support.
18.03	Develop design plans, for example, character sketches, documentation and storyboards for proposed games.
19.0	Explore the methods used to create and sustain player immersion. – The student will be able to:
19.01	Research and define the term “player immersion”.
19.02	Explore and explain the factors that create player immersion in a game.
19.03	Examine popular games and explain the methods each game uses to increase player immersion.
20.0	Become familiar with popular game technology such as DirectX, 3DMAX, and different gaming engines. – The student will be able to:
20.01	Identify and discuss the popular game development tools currently used in the industry.
20.02	Identify and discuss popular gaming engines.
20.03	Research and analyze the uses for different game development tools.

21.0	Demonstrate language arts knowledge and skills. – The student will be able to:
21.01	Locate, comprehend and evaluate key elements of oral and written information.
21.02	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
21.03	Present information formally and informally for specific purposes and audiences.
22.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
22.01	Demonstrate knowledge of arithmetic operations.
22.02	Analyze and apply data and measurements to solve problems and interpret documents.
22.03	Construct charts/tables/graphs using functions and data.
23.0	Demonstrate science knowledge and skills. – The student will be able to:
23.01	Discuss the role of creativity in constructing scientific questions, methods and explanations.
23.02	Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.
Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.	
24.0	Create a working game or simulation individually or as part of a team. – The student will be able to:
24.01	Create a storyboard describing the essential elements, plot, flow, and functions of the game/simulation.
24.02	Create a design specification document to include interface and delivery choices, rules of play, navigation functionality, scoring, media choices, start and end of play, special features, and development team credits.
24.03	Using a simple game development tool, create a game or simulation.
24.04	Present the game or simulation.
25.0	Describe the game development life cycle. – The student will be able to:
25.01	Identify steps in the pre-production process including the proof of concept and market research.
25.02	Describe the iterative prototyping process – Alpha, Beta, RTM.
25.03	Determine platform, technology and scripting requirements.
25.04	Implement techniques of scenario development, levels, and missions.

	25.05 Discuss game testing requirements and methods.
	25.06 Identify and describe maintenance, upgrade and sequel issues.
26.0	Identify hardware constraints on video games including processors and I/O devices. – The student will be able to:
	26.01 Identify the different control systems for video games.
	26.02 Compare and contrast personal computer and video game console hardware, including display systems.
	26.03 Explain the factors that can limit the game-playing ability of personal computers.
27.0	Understand the general principles of storytelling. – The student will be able to:
	27.01 Identify the essential elements of a story.
	27.02 Describe how creative writing is used as a game design tool.
	27.03 Compare and contrast methods of delivering a story in a game.
28.0	Understand character archetypes and character design. – The student will be able to:
	28.01 Research and identify common character archetypes used in computer games.
	28.02 Design character prototypes to physically match archetype.
	28.03 Apply symbolize and semiotic design elements within character design to convey meaning.
	28.04 Create character backstory and profile.
29.0	Understand the use of storyboarding in game design. – The student will be able to:
	29.01 Assess the techniques used in the gaming industry for rendering basic Game Design Art.
	29.02 Describe how game layout charts are used in game design.
	29.03 Describe how storyboards in the game design process can be used as a pre-development sales tool.
	29.04 Analyze and compare the use of storyboards in the game design industry with regard to environmental illustrations, level designs, character designs, model sheets and GUI Designs.
30.0	Develop a game design document or cut. – The student will be able to:
	30.01 Evaluate and discuss the choice of delivery system.
	30.02 Evaluate and discuss choices of genre, game design software, art, digital media, and animation software.
	30.03 Create a game strategy overview, character overview, and storyboard overview.

	30.04 Define the rules of play and multi-player options.
	30.05 Create the layout and interfaces overview and digital media overview.
	30.06 Determine the gameplay interaction requirements and create the progression levels overview.
	30.07 Define strategic positioning of game immersion dynamics and psychological effect.
	30.08 Identify hardware and software constraints.
31.0	Understand outlining in game designs. – The student will be able to:
	31.01 Assess techniques of goal design in gaming.
	31.02 Describe the concept of nested victories.
	31.03 Discuss the use of players as agents of change.
	31.04 Compare and contrast examples of understandable context in gaming.
	31.05 Discuss the principles underlying the creation of understandable rules.
	31.06 Describe how skill building is used in game design.
	31.07 Describe conventional techniques of positive feedback.
	31.08 Discuss functional consistency as it relates to the use of interfaces.
32.0	Explore elements of puzzle design. – The student will be able to:
	32.01 Describe the essential elements of a puzzle.
	32.02 Identify the different types of puzzles.
	32.03 Describe the basic principles of high-level puzzle design.
	32.04 Describe the basic principles of low-level puzzle design.
33.0	Discuss game designer strategy considerations. – The student will be able to:
	33.01 Describe the use of artificial intelligence challenges in game design and the need for giving the player rest time between challenges.
	33.02 Evaluate the impact of randomness in game design especially as it pertains to pattern recognition.
	33.03 Identify techniques used in the industry to help the player to navigate.
	33.04 Explain the use of “just barely” victories and failures as an exciting and immersive technique.

	33.05 Assess techniques used to provide a range of challenges and appeal to a wide range of abilities.
	33.06 Describe the psychological cost of failure in games as it pertains to immersion and psychological effect.
	33.07 Identify methods of preparing the player for greater challenge while allowing for plot development as the story serves the game.
34.0	Understand the process of creating and designing player choice. – The student will be able to:
	34.01 Discuss the principles of player-centric design.
	34.02 Research and correlate game complexity level to appropriate age group such that content matches user skill set required.
	34.03 Examine and discuss design elements that encourage continuous active engagement both mental and physical.
	34.04 Analyze design elements that maintain player interest and vary the degree of challenge.
	34.05 Discuss the need for a balance of design elements for the purpose of rewarding and frustrating players.
35.0	Create and design the game flow as it relates to story and plot. – The student will be able to:
	35.01 Identify techniques of introducing the story plot and beginning play.
	35.02 Describe story plot development techniques for the middle of play in game design.
	35.03 Analyze and discuss planning techniques for climax and finale of games.
36.0	Assess common principles and procedures in game flow design. – The student will be able to:
	36.01 Assess missions and scenarios game flow techniques.
	36.02 Describe common use of mission design and campaigns.
	36.03 Evaluate usage of static versus dynamic campaigns.
37.0	Describe player challenge rule creation elements. – The student will be able to:
	37.01 Research common design methods for clearing obstacles or series of obstacles.
	37.02 Describe common design elements introducing skill, luck and combinations including escalating challenges to games.
	37.03 Identify common design elements used to vary weapons, characters and tools.
	37.04 Discuss the incorporation of risk reward and adaptive challenges (AI).
	37.05 Evaluate industry use of boss encounters in games.
	37.06 Analyze and discuss design considerations from the perspective of other players and multi-player environments.

38.0	Identify tools and software commonly used in game development. – The student will be able to:
	38.01 Identify and discuss the popular game development tools currently used in the industry.
	38.02 Identify and discuss popular gaming engines.
	38.03 Identify and discuss popular world building tools.
39.0	Understand the technical methodologies for integrating digital media into a game or simulation. – The student will be able to:
	39.01 Survey and discuss the use of naming conventions and temp sounds.
	39.02 Analyze and discuss methods of matching sound effects to art assets.
	39.03 Identify and categorize commonly used technology sound engine integration equipment.
	39.04 Identify and discuss resources such as sound effects libraries.
	39.05 Examine methods of sound implementation and associated software.
	39.06 Describe how and why digital video may be integrated into a game or simulation design.
	39.07 Describe how special effects differ from animation.
40.0	Identify commonly used art and animation production tools in the game design industry. – The student will be able to:
	40.01 Identify, categorize and discuss art and animation tools commonly used in game design.
41.0	Understand the general concepts of environmental design. – The student will be able to:
	41.01 Survey and evaluate commonly used concept art.
	41.02 Create a world sketch with particular attention to maintaining continuity of style.
	41.03 Describe the emotional/psychological aspects of environmental design that signify mood, façade of freedom, and resource struggling.
42.0	Describe how environmental design is used in conjunction with game level design. – The student will be able to:
	42.01 Examine and evaluate examples of focus on a theme.
	42.02 Describe methods of creating a purposeful architecture giving consideration to continuity and themes and taking advantage of revisiting.
	42.03 Consider and discuss environmental design elements for multi-player or single player games.
	42.04 Describe the history of creating shifts in game design environments and embracing novel ideas.
	42.05 Identify and discuss environmental design pitfalls such as red herrings and cookie-cutter layouts.

43.0	Describe pertinent issues facing game designers. – The student will be able to:
43.01	Discuss the meaning of simulation and give examples of simulation and complexity including architecture, exposure, concealment and heuristics.
43.02	Describe applied event modeling including goal discovery, map making, event exploration, developing incentives and learning in event modeling for games.
43.03	Explain the concepts of modes of understanding, inductive and iconic logic, significance and saturation in event modeling for game design.
44.0	Describe Monte Carlo simulation as it relates to game design. – The student will be able to:
44.01	Discuss the process of specifying events including contexts of simulation, translating event models to simulations, formalizing thematic objectives, prototyping, interface design and use cases with modeling.
44.02	Discuss the process of designing entities including behavior and entity graphics.
44.03	Describe the implementation of entities including enumerating animations, playing with time, creating events, adding an entity class, and creating entity events and behaviors.
44.04	Analyze event modeling in creating a world including the creation of a world class, adding and removing entities, accessing entities, updating and rendering, adding scene hierarchies and handling world events.
44.05	Assess and discuss AI and physics issues for simulation including AI event contexts, adding intelligence and gravity, adding collision detection, updating for collisions and applying mass and force.
44.06	Discuss environmental elements of simulation including logic, cognitive saturation, systems and interpretation, context of reality, shadows and lighting.
44.07	Discuss the simulation of physical systems such as trees and forests and related events such as fires, or insect swarms such as beehives, bird flocks or anthills.
44.08	Describe the simulation of social and economic systems including practical applications, historical precedents, modeling for community events, creation of communities including structures, states events and rendering and altering building states, population behaviors, and controlling influences.
44.09	Describe the process of testing simulations and event models including effectiveness, diagrammatic systems evaluation, context influence, path transitions and assessing messages.
45.0	Understand the use of inventory systems in game design. – The student will be able to:
45.01	Discuss the various methods of describing items in player's inventory in contemporary game design.
45.02	Review and discuss industry methods of communicating how inventory items can have an effect on game play.
46.0	Use information technology tools. – The student will be able to:
46.01	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
46.02	Employ computer operations applications to access, create, manage, integrate, and store information.
46.03	Employ collaborative/groupware applications to facilitate group work.

47.0	Describe the roles within a game studio. – The student will be able to:
	47.01 Describe the nature and types of business organizations.
	47.02 Explain the effect of key organizational systems on performance and quality.
	47.03 List and describe quality control systems and/or practices common to the workplace.
	47.04 Explain the impact of the global economy on business organizations.
48.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	48.01 Evaluate and justify decisions based on ethical reasoning.
	48.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	48.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	48.04 Interpret and explain written organizational policies and procedures.

Course Number: DIG0075 **Occupational Completion Point: B** **Game/Simulation Programmer – 150 Hours – SOC Code 15-1131**
49.0 Identify functions of information processing. – The student will be able to:
49.01 Identify characteristics of high-level languages.
49.02 Identify characteristics of operating systems.
49.03 Identify characteristics of a network.
49.04 Identify needs for software development in the game/simulation industry.
49.05 Identify causes of software development problems in the game/simulation industry.
49.06 Identify most appropriate languages for solving game/simulation industry problems.
49.07 Manipulate data between numbering systems.
49.08 Identify how numeric and non-numeric data are represented in memory.
49.09 Distinguish among integer, fixed-point, and floating-point calculations.
50.0 Test programs. – The student will be able to:
50.01 Develop a plan for testing programs.
50.02 Develop test harnesses for use in program testing.
50.03 Perform debugging activities.
50.04 Distinguish among the different types of program and design errors.
50.05 Evaluate program test results.
50.06 Execute programs and subroutines as they relate to the total application.
50.07 Use trace routines of compilers to assist in program debugging.
50.08 Compile and run programs.
50.09 Create a stable code base.
51.0 Plan program design. – The student will be able to:
51.01 Formulate a plan to determine program specifications individually or in groups.
51.02 Use a graphical representation or pseudo code to represent the structure in a program or subroutine.

	51.03 Design programs to solve problems using problem-solving strategies.
	51.04 Prepare proper input/output layout specifications.
	51.05 Examine existing utility programs and subroutines for use with other programs.
	51.06 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
52.0	Code programs. – The student will be able to:
	52.01 Utilize reference manuals.
	52.02 Write programs according to recognized programming standards.
	52.03 Write internal documentation statements as needed in the program source code.
	52.04 Code programs in high-level languages for game/simulation applications.
	52.05 Write code that accesses sequential, random, and direct files.
	52.06 Code programs using logical statements (e.g., If-Then-Else, Do...While).
	52.07 Enter and modify source code using a program language editor.
	52.08 Code routines within programs that validate input data.
	52.09 Use the rounding function in calculations within programs.
	52.10 Write programs as part of a development team.
	52.11 Write event-driven programs.
	52.12 Write programs using timed-event strategies and methodologies.
	52.13 Write programs that include score keeping.
53.0	Perform program maintenance. – The student will be able to:
	53.01 Review requested modification of programs and establish a plan of action.
	53.02 Design needed modifications in conformance with established standards.
	53.03 Code, test, and debug modifications prior to updating production code.
	53.04 Update production programs and documentation with changes.
	53.05 Analyze output to identify and annotate errors or enhancements.

54.0	Create and maintain documentation. – The student will be able to:
	54.01 Write documentation to assist operators and end-users.
	54.02 Follow established documentation standards.
	54.03 Update existing documentation to reflect program changes.
55.0	Evaluate assigned game programming tasks. – The student will be able to:
	55.01 Estimate the time necessary to write a program.
56.0	Implement enhanced program structures. – The student will be able to:
	56.01 Write programs that include tables or arrays and routines for data entry and lookup.
	56.02 Write programs to import/export data from external sources.
	56.03 Write programs that use iteration.
	56.04 Write routines that incorporate “help” text.
	56.05 Write programs that read and write random files.
	56.06 Write interactive programs.
	56.07 Design screen layouts for use in interactive programs.
	56.08 Write programs using object-oriented languages.
	56.09 Write programs that include data structures (e.g., stacks, queues, trees, linked lists).
	56.10 Write programs that are event-driven to support player goals and actions.
57.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	57.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	57.02 Explain emergency procedures to follow in response to workplace accidents.
	57.03 Create a disaster and/or emergency response plan.
58.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	58.01 Employ leadership skills to accomplish organizational goals and objectives.
	58.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.

	58.03 Conduct and participate in meetings to accomplish work tasks.
	58.04 Employ mentoring skills to inspire and teach others.
59.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	59.01 Identify and demonstrate positive work behaviors needed to be employable.
	59.02 Develop personal career plan that includes goals, objectives, and strategies.
	59.03 Examine licensing, certification, and industry credentialing requirements.
	59.04 Maintain a career portfolio to document knowledge, skills, and experience.
	59.05 Evaluate and compare employment opportunities that match career goals.
	59.06 Identify and exhibit traits for retaining employment.
	59.07 Identify opportunities and research requirements for career advancement.
	59.08 Research the benefits of ongoing professional development.
	59.09 Examine and describe entrepreneurship opportunities as a career planning option.
60.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:
	60.01 Identify and describe the services and legal responsibilities of financial institutions.
	60.02 Describe the effect of money management on personal and career goals.
	60.03 Develop a personal budget and financial goals.
	60.04 Complete financial instruments for making deposits and withdrawals.
	60.05 Maintain financial records.
	60.06 Read and reconcile financial statements.
	60.07 Research, compare and contrast investment opportunities.

Course Number: DIG0076 **Occupational Completion Point: C** **Game/Simulation Software Developer – 150 Hours – SOC Code 15-1131**	
61.0	Identify and describe basic network terminology and network security. – The student will be able to:
61.01	Define networking and describe the purpose of a network.
61.02	Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).
61.03	Describe the various types of network topologies.
61.04	Describe the various types of game protocols.
61.05	Demonstrate knowledge of general security concepts.
61.06	Develop an awareness of communication security concepts.
61.07	Develop an awareness of network infrastructure security.
61.08	Describe the various types of multiplayer game architectures.
61.09	Identify networking and server design requirements for multi-player games.
61.10	List and describe performance metrics for networked games.
62.0	Game configuration. – The student will be able to:
62.01	Create a window to run a game.
62.02	Describe and use appropriate game libraries to run a windowed game.
62.03	Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available.
62.04	Troubleshoot problems with computer hardware based on different graphic modes of the game.
62.05	Describe ethical issues and problems associated with computer games.
62.06	Read and comprehend technical and non-technical reading assignments related to course content including trade journals, books, magazines and electronic sources.
62.07	Respond to and utilize information derived from multiple sources (e.g., written documents, instructions, e-mail, voice mail) to solve business problems and complete business tasks.
62.08	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
62.09	Identify characteristics of operating systems and graphics pipeline.

	62.10 Distinguish among integer and floating-point bounding box collision calculations.
	62.11 Illustrate various configurations of software libraries.
63.0	Test programs. – The student will be able to:
	63.01 Develop data for use in program testing.
	63.02 Perform debugging activities.
	63.03 Distinguish among the different types of program and design errors.
	63.04 Evaluate program test results.
	63.05 Execute programs and subroutines as they relate to the total application.
	63.06 Use trace routines of compilers to assist in program debugging.
	63.07 Compile and run programs.
64.0	Plan program design. – The student will be able to:
	64.01 Formulate a plan to determine program specifications individually or in groups.
	64.02 Use a graphical representation or pseudo code to represent the structure in a program or subroutine.
	64.03 Design programs to solve problems using problem-solving strategies.
	64.04 Prepare proper input/output layout specifications.
	64.05 Examine existing utility programs and subroutines for use with other programs.
	64.06 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
65.0	Create and maintain documentation. – The student will be able to:
	65.01 Write documentation to assist operators and end-users.
	65.02 Follow established documentation standards.
	65.03 Update existing documentation to reflect program changes.
66.0	Code programs. – The student will be able to:
	66.01 Utilize reference manuals.
	66.02 Write programs according to recognized programming standards.

66.03	Write internal documentation statements as needed in the program source code.
66.04	Code programs in high-level languages for gaming and simulation applications.
66.05	Write code that accesses sequential, indexed sequential, random, and direct files.
66.06	Code programs using logical statements (e.g., if-then-else, do...while).
66.07	Enter and modify source code using a program language editor.
66.08	Code routines within programs that validate input data.
66.09	Use the rounding function in calculations within programs.
66.10	Write programs that display text.
66.11	Demonstrate proficiency in drawing lines using graphic primitive functions.
66.12	Demonstrate proficiency in drawing rectangles using graphic primitive functions.
66.13	Demonstrate proficiency in drawing circles using graphic primitive functions.
66.14	Demonstrate proficiency in drawing ellipses using graphic primitive functions.
66.15	Demonstrate proficiency in drawing polygons using graphic primitive functions.
66.16	Write programs that use composite graphic objects.
66.17	Write programs that load a bitmap for background.
66.18	Write programs that use a sprite handler.
66.19	Write programs that use animation.
66.20	Write programs that use scrolling.
66.21	Write programs that use transparency.
67.0	Demonstrate an understanding of operating systems, environments, and platforms. – The student will be able to:
67.01	Identify various types of operating systems/environments for different computer hardware platforms.
67.02	Assess and analyze the functions of different operating systems.
67.03	Distinguish between different types of computer hardware platforms.

68.0	Implement enhanced program structures. – The student will be able to:
	68.01 Write programs that include tables or arrays and routines for data entry and lookup.
	68.02 Write routines to sort arrays.
	68.03 Write programs that sort records in files.
	68.04 Write programs to process transactions.
	68.05 Write programs that use iteration.
	68.06 Write programs that read and write sequential files.
	68.07 Write programs that read and write random files.
69.0	Implement multimedia programming. – The student will be able to:
	69.01 Demonstrate proficiency in creating multiple composite objects.
	69.02 Demonstrate proficiency in moving composite graphics objects.
	69.03 Demonstrate proficiency in rotating composite graphics objects by hand.
	69.04 Distinguish between flock and flee artificial intelligence algorithms.
	69.05 Write programs that use blitting.
	69.06 Simulate circular game board.
	69.07 Demonstrate proficiency in creating a firing simulation.
	69.08 Identify the basic constructs used in bounding box collision algorithm.
	69.09 Identify the basic constructs used in truer bounding box collision.
	69.10 Demonstrate proficiency in creating a creating a bouncing simulation.
	69.11 Simulate pattern based movement.
	69.12 Simulate multiple sprites movement.
	69.13 Identify the basic constructs used in keyboard input.
	69.14 Identify the basic constructs used in mouse input.
	69.15 Identify the basic constructs used in double buffering.

70.0	Develop an understanding of programming techniques and concepts. – The student will be able to:
	70.01 Identify the basic constructs used in structured programming.
	70.02 Distinguish between top-down and bottom-up design.
	70.03 Distinguish between iteration and recursion.
	70.04 Evaluate Boolean expressions.
	70.05 Distinguish between interpreters and compilers.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 10, and Reading 10. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Game/Simulation/Animation Advanced Applications**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	B082400
CIP Number	0550041117
Grade Level	30, 31
Standard Length	150 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @ 7 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	N/A

Purpose

This program is designed to prepare students for employment as a Game/Simulation Project Manager.

The content includes but is not limited to a capstone opportunity for students to learn and apply principles of project management, team-building, scheduling, coordination and budgeting to create a complete game or simulation product.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of a single capstone course with one occupational completion point. A student who completes the applicable competencies may exit as an occupational completer.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	DIG0077	Game, Simulation, & Animation Advanced Applications	300 hours	15-1199

The Game, Simulation, & Animation Advanced Applications program **must** include the following components:

Pre-Project Planning Conference: The teacher and all team members must participate in a pre-project planning conference, which is essential to designing advanced learning experiences that are appropriate for each individual's learning needs and career interests. It is critical that all parties involved understand and agree on time schedules, expectations, advanced learning applications and evaluation criteria.

Project Criteria: The following criteria shall be met when choosing the Game, Simulation, & Animation Advanced Applications project:

The project must allow experiences that utilize both skills and knowledge directly related to the student's career interests and the Game, Simulation, & Animation Education program in which the student is enrolled or has completed.

The project must provide opportunities for members to experience a high level of interactivity related to the challenges of learning and applying advanced skills.

The project must provide a safe and ethically sound environment with up-to-date facilities and equipment.

Each student must maintain a journal with daily entries describing:

(a) Time spent on the project (log in and log out)
(b) Description of the activity for the period(s)
(c) Materials/equipment/fixtures used
(d) Problems identified
(e) Possible solutions to problems identified
(f) Work accomplished
(g) Solutions attempted
(h) Solutions that failed
(i) Which led to a new problem statement
(j) Video or Still Images of the project as it progresses.
(k) Plans, sketches, drawings, patterns, fixtures or other documentation of components designed or created

Each student will be expected to maintain a portfolio of the project according to the standards contained in this curriculum framework.

A progress report at mid-term will be given by each student to include a written research paper, that describes the area of investigation and an oral presentation to the remainder of the class and instructor or supervising faculty team, on the progress of the project, and all work accomplished. The progress report will be the basis for the mid-term evaluation grade.

A final oral progress report presentation at the end of the course will be given by each student or team that includes:

(a) a review of the portfolio and the journal,
(b) a demonstration of the project's final product
(c) results
(d) problems identified and solutions that worked or did not work, and
(e) a conclusion.

The final progress report will be the basis for the final exam evaluation grade.

When offered for multiple credits, the student should have varied learning experiences in order to provide maximum education exposure.

The course may be supervised by a faculty team consisting of the members of the faculty who will be granting the multiple credit(s) if that is the case.

Project Experience: This component shall provide a match between the student's career interests and a project based situation that will provide exposure to the broad aspects of the selected industry. The assigned tasks should allow a progression and rotation through experiences requiring a variety of knowledge, skills and abilities at increasingly higher levels related to the student's studies and career interests.

Supervision: Teacher-coordinators of the Game, Simulation, & Animation Advanced Applications project must monitor and support learning. Students must also be evaluated a minimum of once per grading period by the teacher-coordinator. The evaluation should assess how well the student is progressing toward goals established by the teacher-coordinator. Portfolio assessment, orchestrated by the teacher-coordinator, is a recommended method of student assessment.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Complete a skills inventory.
02.0 Demonstrate acceptable work values.
03.0 Demonstrate the ability to identify and solve problems.
04.0 Successfully work as a member of a team.
05.0 Manage time according to a plan.
06.0 Keep acceptable records of progress, problems and solutions.
07.0 Plan, organize and carry out a project plan.
08.0 Manage resources.
09.0 Use tools, materials, and processes in an appropriate and safe manner.
10.0 Demonstrate an understanding of the game and simulation development process.
11.0 Demonstrate appropriate scientific content related to the project.
12.0 Demonstrate appropriate mathematics content related to the project.
13.0 Research content related to the project and document the results.
14.0 Use presentation skills, and appropriate media to describe the progress, results and outcome of the experience.
15.0 Demonstrate competency in the area of expertise related to the Game, Simulation & Animation education program previously completed, that this project is based upon.

Florida Department of Education
Student Performance Standards

Program Title: **Game/Simulation/Animation Advanced Applications**
PSAV Number: **B082400**

Course Number: DIG0077 **Occupational Completion Point: A** **Game, Simulation, & Animation Advanced Applications – 150 Hours – SOC Code 15-1199**
01.0 Complete a safety skills inventory. – The student will be able to:
01.01 Practice safety procedures while enrolled in this course.
01.02 Demonstrate an understanding of safety and general policies and procedures.
02.0 Demonstrate acceptable project values. – The student will be able to:
02.01 Maintain a positive relationship with peers.
02.02 Demonstrate adaptive self-management skills.
02.03 Rotate through a wide variety of increasingly responsible experiences.
02.04 Apply basic skills in communications, mathematics, and science appropriate to technological content and learning activities.
03.0 Demonstrate the ability to identify and solve problems. – The student will be able to:
03.01 Prepare a design brief for each step in the project plan to identify constraints or design boundaries.
03.02 Identify possible solutions for each design brief.
03.03 Complete research and development activities associated with each design brief.
03.04 Document problems as they arise.
03.05 Prepare a problem statement for any activity that is not successful.
03.06 Identify possible solutions for the new problem statement.
03.07 Continue the R & D process until workable solutions are found to each problem stated.

04.0	Successfully work as a member of a team. – The student will be able to:
04.01	Accept responsibility for specific tasks in a given situation.
04.02	Document progress, and provide feedback on work accomplished in a timely manner.
04.03	Complete assigned tasks in a timely and professional manner.
04.04	Reassign responsibilities when the need arises.
04.05	Complete daily tasks as assigned on one's own initiative.
05.0	Manage time according to a plan. – The student will be able to:
05.01	Set realistic time frames and schedules.
05.02	Keep a written time sheet of work accomplished on a daily basis.
05.03	Meet goals and objectives set by the team.
05.04	Identify individual priorities.
05.05	Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities as needed.
06.0	Keep acceptable records of progress problems and solutions. – The student will be able to:
06.01	Develop a record keeping system in the form of a log book to record daily progress.
06.02	Use a project journal to identify problem statement.
06.03	Develop a portfolio of work accomplished to include design drawings, research, drawings and plans, storyboards, models, mock-ups and prototypes.
07.0	Plan, organize, and carry out a project plan. – The student will be able to:
07.01	Determine the scope of a project.
07.02	Organize the team according to individual strengths.
07.03	Assign specific tasks within a team.
07.04	Determine project priorities.
07.05	Identify required resources.
07.06	Plan research, design, development, and evaluation activities as required.
07.07	Carry out the project plan to successful completion.

08.0	Manage resources. – The student will be able to:
	08.01 Identify required resources for each stage of the project plan.
	08.02 Determine the methods needed to acquire needed resources.
	08.03 Demonstrate good judgment in the use of resources.
	08.04 Recycle and reuse resources where appropriate.
	08.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.
09.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:
	09.01 Identify the proper tool for a given job.
	09.02 Use tools and machines in a safe manner.
	09.03 Adhere to laboratory or job site safety rules and procedures.
	09.04 Identify the application of processes appropriate to the task at hand.
	09.05 Identify materials appropriate to their application.
10.0	Demonstrate an understanding of the game and simulation development process. – The student will be able to:
	10.01 State the goals of the game or simulation clearly.
	10.02 Identify and write a plan to achieve each goal.
	10.03 Develop a list of materials and content required for each goal.
	10.04 Develop a step by step procedure for developing the game or simulation.
	10.05 Follow a written procedure.
	10.06 Record data from evaluation activities.
	10.07 Document conclusions and solutions based on evaluation results, observations and data.
	10.08 Document progress using a project log.
	10.09 Write an abstract describing the project plan.
11.0	Demonstrate appropriate scientific content related to the project. – The student will be able to:
	11.01 Document how types of motion may be described, measured, and predicted.
	11.02 Demonstrate how types of force that act on an object and the effect of that force can be described, measured, and predicted.

11.03	Document how the principles of Human Computer Interface (HCI) are incorporated into the project design.
11.04	Demonstrate how science, technology, and society are interwoven and interdependent.
12.0	Demonstrate appropriate mathematics content related to the project. – The student will be able to:
12.01	Identify different ways numbers are represented and used.
12.02	Demonstrate proper use of the number systems.
12.03	Develop effective operations on numbers and the relationships among these operations.
12.04	Use estimation in problem solving and computation.
12.05	Apply theories used in the solution to numbers.
12.06	Use quantities in the real world and uses the measures to solve problems.
12.07	Compare data within systems of measurement (both standard/nonstandard and metric/customary).
12.08	Solve mathematical problems using length, time, weight/mass, temperature, money, perimeter, area, and volume, and estimate the effects of measurement errors on calculations.
12.09	Apply appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.
12.10	Describe, draw, Identify, and analyzes two-and three-dimensional shapes.
12.11	Visualize and illustrate ways in which shapes can be combined, subdivided, and changed.
12.12	Coordinate geometry to locate objects in both two and three dimensions and to describe objects algebraically.
12.13	Describe, analyze, and generalize a wide variety of patterns, relations, and functions.
12.14	Uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.
12.15	Uses the tools of data analysis for managing information.
12.16	Identify patterns and makes predictions from an orderly display of data using concepts of probability and statistics.
12.17	Uses statistical methods to make inferences and valid arguments about real-world situations.
13.0	Research content related to the project and document the results. – The student will be able to:
13.01	Identify the basic research needed to develop the project plan.
13.02	Identify available resources for completing background research required in the project plan.
13.03	Demonstrate the ability to locate resource materials in a library, data base, internet and other research resources.

	13.04 Demonstrate the ability to organize information retrieval.
	13.05 Demonstrate the ability to prepare a topic outline.
	13.06 Write a draft of the research report.
	13.07 Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.
	13.08 Prepare an electronically composed research paper in proper form.
	13.09 Conduct an alpha and beta evaluation of the project's product.
	13.10 Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.
14.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:
	14.01 Prepare a multi-media presentation on the completed project.
	14.02 Make an oral presentation, using multi-media materials.
	14.03 Review the presentation, and make changes in the delivery method(s) to improve presentation skills.
15.0	Demonstrate competency in the area of expertise related to the Game, Simulation & Animation education program previously completed that this project is based upon. – The student will be able to:
	15.01 Demonstrate a mastery of the content of the selected subject area.
	15.02 Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.
	15.03 Demonstrate the ability to apply the knowledge, experience and skill developed in the previous program completion to the successful completion of this demonstration.
	15.04 Demonstrate the acquisition of additional knowledge, skill and experience in one area of the selected field of study beyond the performance standards of the initial program standards.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Geospatial/Geographic Information Systems (GIS) Technology**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	T860020
CIP Number	0545070214
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	BUS ED @2 COMPU SCI 6 TEC ED @2 TEC EN AID @7 G *** See Note Below**
CTSO	FL-TSA, SkillsUSA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

***Special Note**-- Any Vocational Coverage suitable for Secondary or PSAV implementation accompanied by industry-recognized GIS Technician certification in accordance with FS 1012.39*

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic benchmarks and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

This program is designed to prepare students for employment as a GIS Technology Assistant or a GIS Technician. Students are introduced to the concepts of Geospatial/Geographic Information System (GIS) and Remote Sensing (RS) Technology — an organized collection of computer hardware, specialized software, and geographic data designed to efficiently capture, store, update, manipulate, analyze, and display all forms of

geographically referenced (spatial) information. Students will research and learn detailed information about global and local matters related to political, environmental, commercial, and other areas, through the use of specialized geospatial tools and products.

This program offers a broad foundation of core knowledge, transferable skills, and applications to prepare students for future careers as skilled GIS/RS professionals. As GIS is a rapidly developing field, GIS professionals are in high demand and this program will prepare students for entry into the field. The content of this program includes the development of the following computer skills and concepts: computer application skills (e.g., word processing, spreadsheet, presentation, and desktop publishing), Internet browser applications, computer programming, advanced web tools, and basic concepts of relational databases and the tools to use them. Additionally, this program stresses understanding and demonstration of GIS and RS concepts, project management strategies, applications of geographic data elements and remotely sensed data, visualizations of spatial data, data inventory management, demographic and economic data analysis, data collection methods and techniques, and extensive exploration of GIS/RS careers and job opportunities.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	GIS0090	GIS Technician Assistant	300 hours	15-1199
B	GIS0091	GIS Technician	300 hours	15-1199

Program Implementation

This program emphasizes the development of abilities and/or awareness necessary to function in a highly technological society. The use of cooperative learning groups is recommended. By learning and practicing group process skills, students will be prepared to work "together" in real work situations. Program graduates will develop enhanced self-esteem as well as the problem-solving and teamwork skills necessary to succeed in careers and postsecondary education. Students will gain knowledge about career paths, have access to business role models, and have choices they would not otherwise have.

The Geospatial/Geographic Information Systems (GIS) Technology program places a strong emphasis on workplace learning. Shadowing and mentoring experiences with GIS professionals along with on-site trips to local businesses connect classroom learning to the workplace. In-class guest speakers bring the real world into the classroom.

Although a variety of GIS software applications and utilities are available in industry, the standards specified in this program focus on the underlying functions and associated competencies in alignment with the STARS program (www.digitalquest.com).

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this course the student will be able to perform the following:

01.0 Perform general computer application activities.
02.0 Understand the history, societal implications, underlying theories, and industry applications of GIS technology.
03.0 Understand map types, purposes, and information they depict.
04.0 Demonstrate an understanding of coordinate systems, projections, scale, multi-spectral imagery, and other concepts integral to geographic information systems.
05.0 Create, change, and manipulate data used to create a map.
06.0 Layout and print maps.
07.0 Design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals
08.0 Customize the display of geospatial data.
09.0 Manage, query, and symbolize geospatial data.
10.0 Create a geospatial model.
11.0 Create, change, and manipulate remotely sensed image data.
12.0 Demonstrate language arts knowledge and skills.
13.0 Demonstrate mathematics knowledge and skills.
14.0 Demonstrate science knowledge and skills.
15.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
16.0 Solve problems using critical thinking skills, creativity and innovation.
17.0 Use information technology tools.
18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
19.0 Describe the importance of professional ethics and legal responsibilities.
20.0 Create surface models of spatial data to map distance.
21.0 Demonstrate density models of spatial data.
22.0 Demonstrate different surface interpolation methods.
23.0 Demonstrate different surface analysis methods.
24.0 Use different statistical methods in raster analysis.
25.0 Interpret different types of spatial data used in 3D visualization and analysis.
26.0 Create network datasets using existing shapefiles and geodatabases.
27.0 Create an extensive campus-based geospatial project.
28.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
30.0 Explain the importance of employability skill and entrepreneurship skills.
31.0 Demonstrate personal money-management concepts, procedures, and strategies.

Florida Department of Education
Student Performance Standards

Program Title: **Geospatial/Geographic Information Systems (GIS) Technology**
PSAV Number: **T860020**

Course Number: GIS0090 **Occupational Completion Point: A** **GIS Technician Assistant – 300 Hours – SOC Code 15-1199**	
01.0	Perform general computer application activities. – The student will be able to:
01.01	Develop keyboarding skills to enter and manipulate text and data.
01.02	Demonstrate basic computer file management skills.
01.03	Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.
01.04	Use spreadsheet, presentation software, and integrated software packages to enhance communication.
01.05	Use computer networks (e.g., Internet, on-line databases) to facilitate collaborative or individual learning and communication.
01.06	Use computers to access, retrieve, organize, process, maintain, interpret, and evaluate data and information.
02.0	Understand the history, societal implications, underlying theories, and industry applications of GIS technology. – The student will be able to:
02.01	Discuss the history and societal implications of mapping, GIS, and remote sensing.
02.02	Describe the underlying theories of GIS and remote sensing technologies.
02.03	Identify industry applications for GIS technology.
03.0	Understand map types, purposes, and information they depict. – The student will be able to:
03.01	Compare and contrast various forms of maps in terms of purpose, information, and application.
03.02	Convert latitude and longitude information between DMS and DD forms.
03.03	Identify sources of GIS information and their applicability to GIS projects.
03.04	Demonstrate how to read a topographical map.
03.05	Identify different types of maps.
03.06	List the major elements of maps.
03.07	Calculate straight line distances on the earth from latitudes and longitudes.

04.0	Demonstrate an understanding of coordinate systems, projections, scale, multi-spectral imagery, and other concepts integral to geographic information systems. – The student will be able to:
04.01	Identify terminology associated with map coordinate systems and location.
04.02	Interpret location using the Geographic Coordinate System to identify absolute location.
04.03	Identify terminology associated with maps, map scale, map projections, and orienteering.
04.04	Explain the Universe Transverse Mercator (UTM) coordinate system.
04.05	Interpret locations using the UTM coordinate system.
04.06	Demonstrate an understanding of how maps are created using aerial photography.
04.07	Explain the State Plane Coordinate System (SPC).
04.08	Interpret locations using the SPC system.
04.09	Convert data from UTM to SPC and from SPC to UTM.
05.0	Create, change, and manipulate data used to create a map. – The student will be able to:
05.01	Identify the primary components of the GIS Project Management Model.
05.02	Utilize a GPS unit to collect waypoints, measure distance, and calculate area.
05.03	Create and customize a localized satellite map scenario using an appropriate GIS software application.
05.04	Demonstrate the use of zooming, identifying, bookmarks, selecting, and panning tools.
05.05	Explain the components of the map display and the tools in the tool bars of common mapping software.
05.06	Explain the need for and uses of metadata.
05.07	Demonstrate geocoding addresses, heads-up digitizing, editing symbols, clipping data layers, and creating buffers.
05.08	Demonstrate various styles of displaying symbols of data, sorting querying, and selection techniques.
05.09	Demonstrate editing feature data.
05.10	Explain spatial reference.
05.11	Demonstrate how to georeference an Image Data Layer and add Control Points.

06.0	Layout and print maps. – The student will be able to:
06.01	Demonstrate the ability to define page margins and parameters for printing a specific size.
06.02	Demonstrate effective use of map elements that must be included in a map including title, author, data, legend, scale bar, north arrow.
06.03	Demonstrate effective use of page space through map scale and frame size.
06.04	Demonstrate process of creating digital archives of maps utilizing the export command.
07.0	Design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals. – The student will be able to:
07.01	Research, compare, and contrast GIS technology careers (e.g., characteristics needed, skills required, education required, industry certifications, advantages and disadvantages of GIS technology careers, the need for GIS technology workers).
07.02	Describe the variety of occupations and professions within the world of GIS technology including those where information technology is either in a primary focus or in a supportive role.
07.03	Describe job requirements for the variety of occupations and professions within the global world of GIS technology.
07.04	Analyze personal skills and aptitudes in comparison with GIS technology career opportunities.
07.05	Refine and implement a plan to facilitate personal growth and skill development related to GIS technology career opportunities.
07.06	Develop and maintain an electronic career portfolio, to include, but not limited to the Resume and Letter of Application.
08.0	Customize the display of geospatial data. – The student will be able to:
08.01	Edit Layer Properties.
08.02	Create Layer Files.
08.03	Edit an attribute table by adding a new field with calculating values.
08.04	Perform relates and joins with data tables.
09.0	Manage, query, and symbolize geospatial data. – The student will be able to:
09.01	Label features.
09.02	Insert, copy, and paste data into new data frames.
09.03	Create graphs and reports from data.
09.04	Demonstrate how to analyze land use, population, and flood zone data.
09.05	Create geospatial data.

	09.06 Symbolize a raster layer.
	09.07 Resolve unmatched addresses while geocoding addresses.
	09.08 Use dissolve features, hyperlink, spatially join data, and create buffer functions.
10.0	Create a geospatial model. – The student will be able to:
	10.01 Create a geodatabase, import existing feature classes into a geodatabase, and import multiple feature classes to a geodatabase.
	10.02 Plan and build a local data inventory.
11.0	Create, change, and manipulate remotely sensed image data. – The student will be able to:
	11.01 View single band and multispectral images.
	11.02 Perform various manipulations to an image including creating a subset of an image, mosaic two georeferenced images, and orthorectification.
	11.03 Perform image analysis by orthorectifying non-georeferenced digital images to existing map features.
	11.04 Use various tools in image analysis to extract land features from imagery data.
	11.05 Categorize land cover types using image analysis tools.
	11.06 Conduct vegetation analysis on imagery using image analysis tools.
	11.07 Evaluate areas of change in images.
	11.08 Enhance an image by adjusting the brightness and contrast, adjusting the histogram, applying custom histogram stretches, sharpening and smoothing its appearance.
	11.09 Convert an image from color IR to natural color by performing a resolution merge.
12.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	12.01 Locate, comprehend and evaluate key elements of oral and written information.
	12.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	12.03 Present information formally and informally for specific purposes and audiences.
	12.04 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	12.05 Present information formally and informally for specific purposes and audiences.
13.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	13.01 Demonstrate knowledge of arithmetic operations.

	13.02 Analyze and apply data and measurements to solve problems and interpret documents.
	13.03 Construct charts/tables/graphs using functions and data.
14.0	Demonstrate science knowledge and skills. – The student will be able to:
	14.01 Discuss the role of creativity in constructing scientific questions, methods and explanations.
	14.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.
	14.03 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	14.04 Present information formally and informally for specific purposes and audiences.
15.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	15.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	15.02 Locate, organize and reference written information from various sources.
	15.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	15.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	15.05 Apply active listening skills to obtain and clarify information.
	15.06 Develop and interpret tables and charts to support written and oral communications.
	15.07 Exhibit public relations skills that aid in achieving customer satisfaction.
16.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	16.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	16.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	16.03 Identify and document workplace performance goals and monitor progress toward those goals.
	16.04 Conduct technical research to gather information necessary for decision-making.
17.0	Use information technology tools. – The student will be able to:
	17.01 Use personal information management (PIM) applications to increase workplace efficiency.
	17.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	17.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	17.04 Employ collaborative/groupware applications to facilitate group work.

18.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
18.01	Describe the nature and types of business organizations.
18.02	Explain the effect of key organizational systems on performance and quality.
18.03	List and describe quality control systems and/or practices common to the workplace.
18.04	Explain the impact of the global economy on business organizations.
19.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
19.01	Evaluate and justify decisions based on ethical reasoning.
19.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
19.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
19.04	Interpret and explain written organizational policies and procedures.

Course Number: GIS0091 **Occupational Completion Point: B** **GIS Technician – 300 Hours – SOC Code 15-1199**	
20.0	Create surface models of spatial data to map distance. – The student will be able to:
	20.01 Create a straight line distance calculation.
	20.02 Create a cost weighted distance calculation based on multiple inputs (costs).
	20.03 Analyze an allocation grid created from a distance analysis calculation.
21.0	Demonstrate density models of spatial data. – The student will be able to:
	21.01 Identify different distance density calculation techniques.
	21.02 Calculate density using both the kernel and simple calculation methods.
22.0	Demonstrate different surface interpolation methods. – The student will be able to:
	22.01 Create a surface from a set of features using the Inverse Distance Weighted interpolation method.
	22.02 Create a surface from a set of features using the Spline interpolation method.
	22.03 Create a surface from a set of features using the Kriging interpolation method.
23.0	Demonstrate different surface analysis methods. – The student will be able to:
	23.01 Create elevation contour data from an elevation raster.
	23.02 Calculate and display slope derived from an elevation raster.
	23.03 Determine and display aspect from an elevation raster.
	23.04 Create a hillshade surface from an elevation raster.
	23.05 Calculate the viewshed of a surface to determine visible objects.
	23.06 Calculate the cut/fill of a surface to estimate volume changes.
24.0	Use different statistical methods in raster analysis. – The student will be able to:
	24.01 Calculate cell statistics using temporal raster grid data.
	24.02 Calculate neighborhood statistics and zonal statistics using raster grid data.

25.0	Interpret different types of spatial data used in 3D visualization and analysis. – The student will be able to:
25.01	Navigate various types of surfaces.
25.02	Explore methods of obtaining, downloading, and extracting free data using the Internet.
25.03	Build 3D datasets.
25.04	Display 2D features onto a 3D surface.
25.05	Create shapefiles to view in a 3D environment.
25.06	Construct a 3D model of an urban environment.
25.07	Display georeferenced data measurements in 3D.
25.08	Apply Interpolation methods.
25.09	Utilize georeferenced 2D data in a 3D environment to provide valuable information.
25.10	Create contour lines in a 3D environment.
25.11	Search, select, and download public domain data and imagery from the Nation Elevation Dataset (NED).
26.0	Create network datasets using existing shapefiles and geodatabases. – The student will be able to:
26.01	Find the most efficient routes for multiple stops on a complex street network.
26.02	Generate directions from one location to another using a street network.
26.03	Find the closest facility from a location on a complex street network.
26.04	Define service areas using a street network based on travel time.
26.05	Create an Origin-Destination Cost Matrix to communicate costs associated with travel from facilities to destinations in a geospatial network.
26.06	Demonstrate modeling of real world traffic flow.
26.07	Create a 3D map using a GPS unit for use in a class wide project.
27.0	Create an extensive campus-based geospatial project. – The student will be able to:
27.01	Create a campus inventory.
27.02	Plan a complete geospatial project.
27.03	Implement a campus-based geospatial project.

	27.04 Organize project into an effective report including map layouts.
	27.05 Present project using a written and/or oral report.
28.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	28.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	28.02 Explain emergency procedures to follow in response to workplace accidents.
	28.03 Create a disaster and/or emergency response plan.
29.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives – The student will be able to:
	29.01 Employ leadership skills to accomplish organizational goals and objectives.
	29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	29.03 Conduct and participate in meetings to accomplish work tasks.
	29.04 Employ mentoring skills to inspire and teach others.
30.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	30.01 Identify and demonstrate positive work behaviors needed to be employable.
	30.02 Develop personal career plan that includes goals, objectives, and strategies.
	30.03 Examine licensing, certification, and industry credentialing requirements.
	30.04 Maintain a career portfolio to document knowledge, skills, and experience.
	30.05 Evaluate and compare employment opportunities that match career goals.
	30.06 Identify and exhibit traits for retaining employment.
	30.07 Identify opportunities and research requirements for career advancement.
	30.08 Research the benefits of ongoing professional development.
	30.09 Examine and describe entrepreneurship opportunities as a career planning option.
31.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:
	31.01 Identify and describe the services and legal responsibilities of financial institutions.
	31.02 Describe the effect of money management on personal and career goals.

31.03	Develop a personal budget and financial goals.
31.04	Complete financial instruments for making deposits and withdrawals.
31.05	Maintain financial records.
31.06	Read and reconcile financial statements.
31.07	Research, compare and contrast investment opportunities.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills (if applicable)

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 10, and Reading 10. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed at http://www.fldoe.org/core/fileparse.php/5423/urlt/2014-15-basicskills-with-License-exempt.rtf.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Technology Support Services**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y100100
CIP Number	0515120200
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in computer technology support positions in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills.

The content includes but is not limited to practical experiences in the implementation, management, and maintenance of advanced technology user environments.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point in the program.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	CTS0059	Technology Support Specialist	600 hours	15-1151

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of computer systems.
02.0 Demonstrate knowledge of different operating systems.
03.0 Develop a familiarity with the information technology industry.
04.0 Develop an awareness of microprocessors and digital computers.
05.0 Develop an awareness of programming languages.
06.0 Develop an awareness of emerging technologies.
07.0 Demonstrate an understanding of the Open Systems Interface (OSI) model.
08.0 Identify computer components and their functions.
09.0 Demonstrate proficiency using the Internet to locate information.
10.0 Demonstrate proficiency using Hypertext Markup Language (HTML).
11.0 Demonstrate proficiency in webpage design.
12.0 Demonstrate proficiency using common software applications.
13.0 Perform email activities.
14.0 Demonstrate proficiency in using presentation software and equipment.
15.0 Perform decision-making activities in a multimedia environment.
16.0 Demonstrate proficiency with personal computer hardware.
17.0 Demonstrate proficiency with installing and configuring client system hardware.
18.0 Demonstrate proficiency in troubleshooting, repair and maintenance of client systems.
19.0 Demonstrate proficiency with client operating systems and software.
20.0 Configure and perform system backup and recovery of a client system.
21.0 Configure a Virtual Hard Disk (VHD) on a client system.
22.0 Demonstrate proficiency with networking.
23.0 Demonstrate an understanding of fundamental computer security.
24.0 Demonstrate proficiency with installing, configuring, and upgrading common client software applications or suites.
25.0 Solve software installation escalations.
26.0 Solve software failure escalations.
27.0 Demonstrate proficiency with technical support operational procedures.
28.0 Describe the operation of data networks.
29.0 Differentiate between various network media and topologies.
30.0 Install and configure basic network devices.
31.0 Demonstrate proficiency using basic network tools.
32.0 Demonstrate an understanding of network IP addressing and associated issues.
33.0 Demonstrate an understanding of network management tasks and methodologies.
34.0 Implement a Wireless Local Area Network (WLAN).
35.0 Demonstrate an understanding of network security threats and mitigation techniques.
36.0 Demonstrate proficiency with troubleshooting network operating systems.
37.0 Configure Full Disk Encryption (FDE) software (e.g., BitLocker, BitLocker To Go).
38.0 Configure intranet tunneling software (e.g., DirectAccess, Barracuda).

39.0 Demonstrate proficiency with Network Mobility (NEMO) basic support protocol.
40.0 Demonstrate proficiency in configuring and maintaining remote connections.
41.0 Perform installation, configuration, and management operations for both client and server disks.
42.0 Monitor system performance.
43.0 Optimize system performance.
44.0 Demonstrate proficiency with troubleshooting specialized network and communications devices.
45.0 Configure and maintain network-based technologies associated with providing web services.

Florida Department of Education
Student Performance Standards

Program Title: **Technology Support Services**
PSAV Number: **Y100100**

Course Number: CTS0059 **Occupational Completion Point: A** **Technology Support Specialist – 600 Hours – SOC Code 15-1151**
01.0 Demonstrate knowledge, skill, and application of computer systems. – The student will be able to:
01.01 Describe and use current and emerging computer technology and software to perform personal and business related tasks.
01.02 Describe the types of communications and networking systems used in workplace environments.
01.03 Locate and use software application reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals.
01.04 Troubleshoot problems with computer hardware peripherals.
01.05 Describe ethical, privacy, and security issues and problems associated with computers and information systems.
01.06 Demonstrate proficiency in using the basic features of GUI browsers.
02.0 Demonstrate knowledge of different operating systems. – The student will be able to:
02.01 Identify the most common computer operating systems.
02.02 Describe and use industry accepted file naming conventions, particularly in NTFS and FAT file systems.
02.03 Demonstrate proficiency with file management tasks (e.g., folder creation, file creation, backup, copy, delete, open, save).
02.04 Demonstrate a working knowledge of standard file formats.
02.05 Compare and contrast various operating systems (e.g., DOS, Windows, Mac, and Linux).
02.06 Differentiate between different operating systems and applications.
02.07 Compare and contrast open source and proprietary software.
02.08 Explain how system utilities are used to maintain computer performance.
03.0 Develop a familiarity with the information technology industry. – The student will be able to:
03.01 Explain how information technology impacts the operation and management of business and society.

03.02	Identify and describe the various ways of segmenting the IT industry (e.g., hardware vs. software, server vs. client, business vs. entertainment, stable vs. mobile).
03.03	Describe how digital technologies (social media) are changing both work and personal lifestyles.
04.0	Develop an awareness of microprocessors and digital computers. – The student will be able to:
04.01	Describe the evolution of the digital computer.
04.02	Explain the general architecture of a microcomputer system.
04.03	Explain the evolution of microprocessors.
04.04	Explain software hierarchy and its impact on microprocessors.
04.05	Explain the need for and use of peripherals.
04.06	Demonstrate proficiency installing and using plug-and-play peripherals.
04.07	Identify the basic concepts of computer maintenance and upgrades.
05.0	Develop an awareness of programming languages. – The student will be able to:
05.01	Explain the evolution of programming languages.
05.02	Explain the need for and use of compilers.
05.03	Identify the three types of programming design approaches (e.g., top-down, structured, object-oriented).
05.04	Compare the various types or classes of programming languages (e.g., compiled, interpretive).
05.05	Differentiate among source code, machine code, interpreters, and compilers.
05.06	Characterize the major categories of programming languages and how they are used.
05.07	Create a model flowchart for a computer program.
05.08	Describe the stages in the software development life cycle and explain how to successfully implement them.
06.0	Develop an awareness of emerging technologies. – The student will be able to:
06.01	Compare and contrast emerging technologies and describe how they impact business in the global marketplace (e.g., wireless, wireless web, cell phones, portables/handhelds, smart appliances, home networks, peer-to-peer).
06.02	Describe social media as an emerging technology.
06.03	Adhere to published best practices for protecting personal identifiable information when using the Internet.
06.04	Identify trends related to the use of information technology in people's personal and professional lives.
06.05	Characterize how the rapid pace of change in information technology impacts our society.

07.0	Demonstrate an understanding of the Open Systems Interface (OSI) model. – The student will be able to:
	07.01 Describe the evolution of OSI from its inception to the present and into the future.
	07.02 Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.
	07.03 Describe the purpose of the OSI model and each of its layers.
	07.04 Explain specific functions belonging to each OSI model layer.
	07.05 Understand how two network nodes communicate through the OSI model.
	07.06 Discuss the structure and purpose of data packets and frames.
	07.07 Describe the two types of addressing covered by the OSI model.
08.0	Identify computer components and their functions. – The student will be able to:
	08.01 Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).
	08.02 Use common computer and programming terminology.
09.0	Demonstrate proficiency using the Internet to locate information. – The student will be able to:
	09.01 Identify and describe web terminology.
	09.02 Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).
	09.03 Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).
	09.04 Describe and observe Internet/Intranet ethics and copyright laws and regulatory control.
	09.05 Trace the evolution of the Internet from its inception to the present and into the future.
	09.06 Demonstrate proficiency using search engines, including Boolean search strategies.
	09.07 Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).
	09.08 Compare and contrast the roles of web servers and web browsers.
10.0	Demonstrate proficiency using Hypertext Markup Language (HTML). – The student will be able to:
	10.01 Categorize websites according to their purpose.
	10.02 Describe the types of documents that might be used in a web environment (e.g., HTML, ASP, DHTML, XML, JS, CSS, PHP).
	10.03 Identify elements of a webpage.

10.04	Define basic HTML terminology.
10.05	Critique the aesthetic and functional operation of sample websites.
10.06	Create storyboards depicting a multi-page website (e.g., linear, hierarchical).
10.07	Design, edit, and test HTML documents for accuracy and validity.
10.08	Create and modify webpages using a Graphical User Interface (GUI) editor.
10.09	Enhance webpages through the addition of images and graphics including animation.
10.10	Analyze webpage source code developed by others.
10.11	Create webpages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
11.0	Demonstrate proficiency in webpage design. – The student will be able to:
11.01	Develop an awareness of acceptable webpage design, including index pages, in relation to the rest of the website.
11.02	Describe and apply color theory as it applies to webpage design (e.g., background, text color).
11.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
11.04	Use image design software to create and edit images.
11.05	Demonstrate proficiency in publishing to the Internet.
11.06	Explain the need for web-based applications.
12.0	Demonstrate proficiency using common software applications. – The student will be able to:
12.01	Compare and contrast the appropriate use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, email, presentation, database, scheduling, financial management, Java applet, music).
12.02	Demonstrate proficiency in the use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, email, presentation, database, scheduling, financial management, Java applet, music).
13.0	Perform email activities. – The student will be able to:
13.01	Describe email capabilities and functions.
13.02	Identify components of an email message.
13.03	Identify the components of an email address.
13.04	Identify when to use different email options.
13.05	Attach a file to an email message.

13.06	Forward an email message.
13.07	Use an address book.
13.08	Reply to an email message.
13.09	Use the Internet to perform email activities.
13.10	Identify the appropriate use of email and demonstrate related email etiquette.
13.11	Identify when to include information from an original email message in a response.
13.12	Identify common problems associated with widespread use of email.
14.0	Demonstrate proficiency in using presentation software and equipment. – The student will be able to:
14.01	Produce a presentation that includes music, animation, and digital photography and present it using a projection system.
14.02	Using presentation software, create a multimedia presentation that incorporates shot and edited video, animation, music, narration and adheres to good design principles, use of transitions, and effective message conveyance.
14.03	Demonstrate knowledge of the roles and responsibilities of a multimedia production team (e.g., project manager, creative or design director, content experts, writers, graphic designers, animators, sound designers, videographer, interface designers/programmers).
14.04	Collaborate with team members to plan, edit, evaluate, and present a multimedia presentation where individuals on the team function in specific production roles.
14.05	Create a self-running presentation with synchronized audio, convert presentation slides (e.g. PowerPoint) into streaming ASF files for use on the Web.
15.0	Perform decision-making activities in a multimedia environment. – The student will be able to:
15.01	Determine work priorities, the audience, project budgets, project specifications, and the production schedule.
15.02	Evaluate and select appropriate software packages and multimedia tools to complete assigned tasks.
15.03	Present and defend design projects.
15.04	Evaluate criteria for selecting an operating system.
16.0	Demonstrate proficiency with personal computer hardware. – The student will be able to:
16.01	Categorize storage devices and backup media.
16.02	Explain motherboard components, types and features.
16.03	Classify power supplies types and characteristics.
16.04	Explain the purpose and characteristics of CPUs and their features.

16.05	Explain cooling methods and devices.
16.06	Compare and contrast memory types, characteristics and their purpose.
16.07	Distinguish between the different display devices and their characteristics.
16.08	Summarize the function and types of adapter cards.
17.0	Demonstrate proficiency with installing and configuring client system hardware. – The student will be able to:
17.01	Install, configure and optimize personal computer components.
17.02	Install, configure, and optimize laptop components.
17.03	Install, configure, and optimize client system peripherals (e.g., output devices, input devices).
17.04	Demonstrate proficiency using the following tools:
17.04.1	Multimeter.
17.04.2	Power supply tester.
17.04.3	Specialty hardware / tools.
17.04.4	Cable testers.
17.04.5	Loop back plugs.
17.04.6	Anti-static pad and wrist strap.
17.04.7	Extension magnet.
18.0	Demonstrate proficiency in troubleshooting, repair and maintenance of client systems. – The student will be able to:
18.01	Explain the troubleshooting theory.
18.02	Explain and interpret common hardware and operating system symptoms and their causes.
18.03	Determine the troubleshooting methods and tools for printers.
18.04	Explain and interpret common laptop issues and determine the appropriate basic troubleshooting method.
18.05	Integrate common preventative maintenance techniques.
18.06	Analyze system/application logs and other system resources to identify and/or resolve performance issues related to display, disk space, and virtual memory.
18.07	Use appropriate client system tools and utilities to diagnose and resolve hardware failure issues, including hard drive sectors, memory, cabling, and BIOS.

19.0	Demonstrate proficiency with client operating systems and software. – The student will be able to:
19.01	Compare and contrast the different client operating systems and their features.
19.02	Given a scenario, demonstrate proper use of user interfaces.
19.03	Explain the process and steps to install and configure a client operating system.
19.04	Explain the basics of boot sequences, methods and startup utilities.
19.05	Perform a clean installation of an operating system.
19.06	Perform a version upgrade to an existing operating system, maintaining user profiles, preferences, and historical information.
20.0	Configure and perform system backup and recovery of a client system. – The student will be able to:
20.01	Compare and contrast system backup and system imaging.
20.02	Create a system image file or backup file as appropriate.
20.03	Create system restore points.
20.04	Configure system images and backup files for automatic update.
20.05	Recover a system using either a system image file or backup file.
21.0	Configure a Virtual Hard Disk (VHD) on a client system. – The student will be able to:
21.01	Create, deploy, boot, mount, and update a VHD.
21.02	Perform offline updates.
21.03	Perform offline servicing.
22.0	Demonstrate proficiency with networking. – The student will be able to:
22.01	Summarize the basics of networking fundamentals, including technologies, devices and protocols.
22.02	Categorize network cables and connectors and their implementations.
22.03	Compare and contrast the different network types.
22.04	Validate client configuration for network connectivity.
22.05	Install and configure connectivity for a small local area network using either IPv4 or IPv6.
22.06	Set up user accounts for a small local area network.
22.07	Configure file and folder access using NTFS permissions and sharing.

23.0	Demonstrate an understanding of fundamental computer security. – The student will be able to:
23.01	Explain basic security concepts and technologies, including firewalls, encryption technologies, and authentication.
23.02	Describe the following security and authentication features and technologies:
23.02.1	Wireless encryption.
23.02.2	Malicious software protection.
23.02.3	BIOS Security.
23.02.4	Password management/password complexity.
23.02.5	Locking workstation.
23.02.6	Biometrics and smart cards.
23.03	Discuss the basics of data sensitivity and security, including compliance, classifications, and social engineering.
23.04	Install, configure, and launch antivirus software, isolating or removing viruses and malware as needed.
23.05	Configure a local security policy and associated authentication and authorization rules.
24.0	Demonstrate proficiency with installing, configuring, and upgrading common client software applications or suites. – The student will be able to:
24.01	Validate software licensing compliance and system compatibility.
24.02	Perform initial installation of a common software application.
24.03	Perform an upgrade of a common software application.
24.04	Install and configure an Internet browser.
24.05	Install software and/or browser add-ins.
24.06	Resolve configuration issues with newly installed software, to include installation of appropriate drivers and operating files as needed.
25.0	Solve software installation escalations. – The student will be able to:
25.01	Verify installation permissions.
25.02	Validate local administrator requirement.
25.03	Determine licensing restrictions.
25.04	Validate digital signing.

26.0	Solve software failure escalations. – The student will be able to:
26.01	Check the appropriate system/application logs.
26.02	Check whether the application runs in Safe mode.
26.03	Isolate the problem and repair the installation.
26.04	Check recently added programs.
26.05	Restore or reimage the system.
27.0	Demonstrate proficiency with technical support operational procedures. – The student will be able to:
27.01	Adhere to safety and environmental procedures related to ESD, SMI, RFI, electrical safety, cabling, and physical/environmental.
27.02	Describe the characteristics desired in establishing and maintaining good customer relations.
27.03	Demonstrate appropriate communication skills and professionalism in customer interactions.
27.04	Apply call center vocabulary.
28.0	Describe the operation of data networks. – The student will be able to:
28.01	Explain the function of common networking protocols.
28.02	Identify commonly used TCP and UDP default ports.
28.03	Identify address formats.
28.04	Identify the proper use of addressing technologies and addressing schemes.
28.05	Identify common IPv4 and IPv6 routing protocols.
28.06	Explain the purpose and properties of routing.
28.07	Compare the characteristics of wireless communication standards.
28.08	Interpret network diagrams.
28.09	Describe common networking applications.
29.0	Differentiate between various network media and topologies. – The student will be able to:
29.01	Categorize standard cable types and their properties.
29.02	Identify common connector types.

	29.03 Identify common physical network topologies.
	29.04 Differentiate and implement appropriate wiring standards.
	29.05 Select the appropriate media, cables, ports, and connectors to connect network devices.
	29.06 Categorize WAN technology types and properties.
	29.07 Categorize LAN technology types and properties.
	29.08 Explain common logical network topologies and their characteristics.
	29.09 Install components of wiring distribution.
30.0	Install and configure basic network devices. – The student will be able to:
	30.01 Install, configure and differentiate between common network devices.
	30.02 Identify the functions of specialized network devices.
	30.03 Explain the advanced features of a switch.
	30.04 Implement a small switched network, including remote access management.
	30.05 Verify network status and operation using basic utilities (e.g., ping, traceroute, telnet, SSH, arp, ipconfig).
	30.06 Implement a basic wireless network.
31.0	Demonstrate proficiency using basic network tools. – The student will be able to:
	31.01 Select the appropriate command line interface tool and interpret the output to verify functionality.
	31.02 Explain the purpose of network scanners.
	31.03 Utilize the appropriate hardware tools.
32.0	Demonstrate an understanding of network IP addressing and associated issues. – The student will be able to:
	32.01 Assign and verify valid IP addresses in a LAN environment.
	32.02 Describe Network Address Translation (NAT) and its role in network communication.
	32.03 Distinguish between public and private IP addresses.
	32.04 Explain the operation of DHCP and DNS services and their impact on network client systems.
	32.05 Detect and correct IP addressing issues.

33.0	Demonstrate an understanding of network management tasks and methodologies. – The student will be able to:
33.01	Explain the function of each layer of the OSI model.
33.02	Identify types of configuration management documentation.
33.03	Evaluate the network based on configuration management documentation.
33.04	Explain network segmentation and traffic management concepts.
33.05	Conduct network monitoring to identify performance and connectivity issues.
33.06	Explain different methods and rationales for network performance optimization.
33.07	Configure updates to a network operating system to include manual, automatic, and rollback aspects.
33.08	Implement network troubleshooting methodologies.
33.09	Troubleshoot common connectivity issues and select an appropriate solution.
34.0	Implement a Wireless Local Area Network (WLAN). – The student will be able to:
34.01	Describe the standards associated with wireless media.
34.02	Identify and describe the purpose of the components of a small WLAN.
34.03	Configure a small WLAN such that devices connect to the correct access point.
34.04	Describe the security features and capabilities of WI-FI Protected Access (WPA).
34.05	Describe common issues with implementing a WLAN and methods for addressing these issues.
35.0	Demonstrate an understanding of network security threats and mitigation techniques. – The student will be able to:
35.01	Explain the function of hardware and software security devices.
35.02	Explain common features of a firewall.
35.03	Explain the methods of network access security.
35.04	Explain methods of user authentication.
35.05	Explain issues that affect device security.
35.06	Implement password and physical security in a small routed network.
35.07	Identify common security threats and mitigation techniques.

36.0	Demonstrate proficiency with troubleshooting network operating systems. – The student will be able to:
36.01	Select the appropriate commands and options to troubleshoot and resolve problems.
36.02	Select and use system utilities/tools appropriate to a problem and evaluate the results.
36.03	Evaluate and resolve common issues.
37.0	Configure Full Disk Encryption (FDE) software (e.g., BitLocker, BitLocker To Go). – The student will be able to:
37.01	Describe disk encryption and its role and benefits in computer system security.
37.02	Compare and contrast disk encryption with file system encryption.
37.03	Configure system policies to accommodate full disk encryption.
37.04	Explain the role of the Trusted Platform Module (TPM) relative to computer system identification and security.
37.05	Manage TPM startup keys.
37.06	Configure startup key storage.
37.07	Describe a Data Recovery Agent (DRA) and its role in system security.
37.08	Configure a DRA on a client and network server.
37.09	Perform data and system recovery operations.
38.0	Configure intranet tunneling software (e.g., DirectAccess, Barracuda). – The student will be able to:
38.01	Describe Internet Protocol Security (IPSec) and its role in secure tunnel connectivity.
38.02	Compare and contrast the characteristics and operation of an infrastructure tunnel and an intranet tunnel.
38.03	Configure endpoints required for an intranet tunnel connection.
38.04	Configure system and user authentication for an intranet tunnel connection.
38.05	Define the requirements for establishing a network infrastructure tunnel.
38.06	Resolve tunnel connectivity issues.
39.0	Demonstrate proficiency with Network Mobility (NEMO) basic support protocol. – The student will be able to:
39.01	Describe NEMO and its unique challenges (e.g., attachment transparency, session consistency).
39.02	Compare and contrast the three NEMO deployment scenarios (i.e., airline, automotive, personal).

	39.03 Configure offline file policies for synchronized access to network shared files.
	39.04 Describe transparent caching and explain its role in optimizing network performance, particularly mobile networks.
	39.05 Describe Power over Ethernet (PoE) and its role in creating a power management schema.
40.0	Demonstrate proficiency in configuring and maintaining remote connections. – The student will be able to:
	40.01 Establish a Virtual Private Network (VPN) connection with authentication.
	40.02 Enabling a VPN reconnect to accommodate mobile remote users.
	40.03 Perform a Strength, Weakness, Opportunity, and Threat (SWOT) analysis of a local area network configured for remote access connectivity.
	40.04 Describe Network Access Protection (NAP) and its role in ensuring health and compliance of connected devices.
	40.05 Compare and contrast the use of quarantine and captive portals to accomplish remediation of connected devices.
	40.06 Configure NAP for wireless remote connections.
	40.07 Configure dial-up connections.
	40.08 Enable and configure remote desktop in both client and server environments.
41.0	Perform installation, configuration, and management operations for both client and server disks. – The student will be able to:
	41.01 Install, initialize, and partition a hard drive.
	41.02 Describe file system fragmentation and its impact on system performance.
	41.03 Perform a file system defragmentation.
	41.04 Describe Redundant Array of Independent Disks (RAID) configuration.
	41.05 Configure removable device policies.
42.0	Monitor system performance. – The student will be able to:
	42.01 Configuring event logging.
	42.02 Filtering event logs.
	42.03 Event subscriptions.
	42.04 Data collector sets.
	42.05 Generating a system diagnostics report.

43.0	Optimize system performance. – The student will be able to:
43.01	Calculate and configure the size of page files to optimize virtual memory performance.
43.02	Configure the hard drive cache for optimum interface transfer rate.
43.03	Update device drivers.
43.04	Configure a Network Interface Card (NIC) for full duplex operation.
43.05	Create a power plan (scheme) for optimum power/energy efficiency.
43.06	Configure performance settings under Advanced System Properties.
43.07	Configure desktop settings and user profiles.
43.08	Configure services and programs to resolve performance issues.
43.09	Resolve mobile computing performance issues.
44.0	Demonstrate proficiency with troubleshooting specialized network and communications devices. – The student will be able to:
44.01	Select the appropriate commands and options to troubleshoot and resolve problems with network devices.
44.02	Select and use system utilities/tools appropriate to a problem and evaluate the results.
44.03	Evaluate and resolve common issues related to network connectivity, security, and performance of connected devices.
45.0	Configure and maintain network-based technologies associated with providing web services. – The student will be able to:
45.01	Configure and maintain a web server, to include setting up authentication, security certificates, and permissions for Active Server Page operation.
45.02	Configure and maintain Data Source Name (DSN) services.
45.03	Configure and maintain a File Transfer Protocol (FTP) server, to include setting up access and permissions.
45.04	Configure and maintain a Simple Mail Transfer Protocol (SMTP) server, to include setting up security, permissions, and SMTP relay.
45.05	Configure and maintain a Post Office Protocol (POP) server, to include setting up access, permissions, and defaults.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 10, and Reading 10. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan

with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Computer Systems & Information Technology (CSIT)**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y100200
CIP Number	0511090107
Grade Level	30, 31
Standard Length	900 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMP SVC 7G INFO TECH 7 G CYBER TECH 7 G ELECTRONIC @7 ?7 G
CTSO	Phi Beta Lambda BPA SkillsUSA
SOC Codes (all applicable)	15-1152 – Computer Network Support Specialists 15-1142 – Network and Computer Systems Administrators 15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 9

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of occupations in the information technology industry.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the information technology industry; technical and product skills, underlying principles of technology , planning, management, finance, labor issues, community issues and health, safety, and environmental issues.

The content includes but is not limited to communication, leadership skills, human relations and employability skills; and safe, efficient work practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points. When the recommended sequence is followed, the structure is intended to prepare students to complete the CompTIA A+, Network+, and Security+ industry certifications. Sufficient coverage of advanced networking concepts and competencies may also lead to Cisco's CCENT and CCNA industry certifications. A student who completes the applicable competencies at any occupational completion point may either continue with the training or become an occupational completer.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	CTS0082	Computer Systems Technician	300 hours	15-1152
B	CTS0083	Computer Network Technician	150 hours	15-1142
C	CTS0084	Computer Networking Specialist	150 hours	15-1142
D	CTS0069	Computer Security Technician	300 hours	15-1122

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate proficiency with personal computer hardware.
02.0 Demonstrate proficiency in troubleshooting, repair and maintenance.
03.0 Demonstrate proficiency with operating systems and software.
04.0 Demonstrate proficiency with networking.
05.0 Demonstrate proficiency with security.
06.0 Explain the basic physical security elements of a network.
07.0 Demonstrate proficiency with operational procedure.
08.0 Demonstrate language arts knowledge and skills.
09.0 Demonstrate mathematics knowledge and skills.
10.0 Demonstrate proficiency with installing, configuring, and troubleshooting personal computer hardware.
11.0 Demonstrate proficiency with troubleshooting operating systems.
12.0 Demonstrate proficiency with networking.
13.0 Demonstrate proficiency with security.
14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
15.0 Solve problems using critical thinking skills, creating and innovation.
16.0 Use information technology tools.
17.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
18.0 Describe the importance of professional ethics and legal responsibilities.
19.0 Describe the operation of data networks.
20.0 Explain the importance of employability skill and entrepreneurship skills. Verify connectivity between two end devices.
21.0 Configure a Layer 3 switch.
22.0 Configure a router with basic configurations.
23.0 Explain how IPv6 address assignments are implemented in a business network
24.0 Explain how data is moved across the network, from opening an application, to receiving data.
25.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
26.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
27.0 Explain the importance of employability skill and entrepreneurship skills.
28.0 Describe a switched network
29.0 Compare a collision domain to a broadcast domain.
30.0 Troubleshoot inter-VLAN routing in a Layer 3-switched environment.
31.0 Configure ACLs.
32.0 Configure DHCPv4.
33.0 Configure NAT.
34.0 Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends.
35.0 Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk.
36.0 Recognize and be able to differentiate and explain the following access control models.
37.0 Recognize and be able to differentiate and explain the following methods of authentication.

38.0 Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk.
39.0 Recognize and understand the processes and risks associated with the following security concerns and tasks.
40.0 Recognize and understand the administration of the following types of remote access technologies.
41.0 Recognize and understand the administration of the following email security concepts.
42.0 Recognize and understand the administration of the following Internet security concepts.
43.0 Recognize and understand the administration of the following vulnerabilities.
44.0 Recognize and understand the administration of the following directory security concepts.
45.0 Recognize and understand the administration of the following file transfer protocols and concepts.
46.0 Recognize and understand the administration of the following wireless technologies and concepts.
47.0 Compare and contrast the following types of intrusion detection in terms of implementation and configuration.
48.0 Be able to identify and explain the following different kinds of cryptographic algorithms.
49.0 Understand how cryptography and digital signatures address the following security concepts.
50.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure).
51.0 Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles.
52.0 Understand the application of the following concepts of physical security.
53.0 Understand security concerns and concepts of the following types of devices.
54.0 Understand the security concerns for the following types of media.
55.0 Explain the following security topologies as they relate to cybersecurity.
56.0 Implement the process of network system hardening within a computer network.
57.0 Implement the process of server application/service hardening within a computer network.
58.0 Describe the security implications of the following topics of disaster recovery options.
59.0 Understand the security implications of the following topics of business continuity.
60.0 Demonstrate proficiency in applying the concepts and uses of the following types of policies and procedures.
61.0 Explain the following concepts of privilege management.
62.0 Demonstrate an understanding of the concepts of the following topics of forensics.
63.0 Understand and be able to explain the following concepts of risk identification.
64.0 Understand the security relevance of the education and training of end users, executives and human resources.
65.0 Explain the following documentation and their role in cybersecurity.

Florida Department of Education
Student Performance Standards

Program Title: **Computer Systems & Information Technology**
PSAV Number: **Y100200**

Course Number: CTS0082 **Occupational Completion Point: A** **Computer Systems Technician – 300 Hours – SOC Code 15-1152**
01.0 Demonstrate proficiency with personal computer hardware. – The student will be able to:
01.01 Categorize storage devices and backup media.
01.02 Explain motherboard components, types and features.
01.03 Classify power supplies types and characteristics.
01.04 Explain the purpose and characteristics of CPUs and their features.
01.05 Explain cooling methods and devices.
01.06 Compare and contrast memory types, characteristics and their purpose.
01.07 Distinguish between the different display devices and their characteristics.
01.08 Install and configure peripherals and input devices.
01.09 Summarize the function and types of adapter cards.
01.10 Install, configure and optimize laptop components and features.
01.11 Install and configure printers.
01.12 Explain advantages of using PCIe adapter cards.
01.13 Configure tablets and mobile phones.
01.14 Configure network printers using a static IP address.
02.0 Demonstrate proficiency in troubleshooting, repair and maintenance. – The student will be able to:
02.01 Explain the troubleshooting theory.
02.02 Explain and interpret common hardware and operating system symptoms and their causes.

	02.03 Explain and interpret common operating system symptoms and their causes.	
	02.04 Determine the troubleshooting methods and tools for printers.	
	02.05 Explain and interpret common laptop issues and determine the appropriate basic troubleshooting method.	
	02.06 Integrate common preventative maintenance techniques.	
	02.07 Explain and interpret common software symptoms and their causes.	
03.0	Demonstrate proficiency with operating systems and software. – The student will be able to:	
	03.01 Compare and contrast the different Windows Operating Systems from Windows 7 up and their features.	
	03.02 Explain the difference in features of the various Windows versions from Windows 7 through Windows 10.	
	03.03 Explain the process and steps to install and configure the Windows OS.	
	03.04 Explain the basics of boot sequences, methods and startup utilities, including msconfig.	
04.0	Demonstrate proficiency with networking. – The student will be able to:	
	04.01 Summarize the basics of networking fundamentals, including technologies and devices.	
	04.02 Summarize the basics of networking fundamentals, including technologies and protocols.	
	04.03 Categorize network cables and connectors and their implementations.	
	04.04 Compare and contrast the different network types include SOHO networks.	
05.0	Demonstrate proficiency with security. – The student will be able to:	
	05.01 Explain the basic principles of security concepts and technologies (physical, software, social engineering).	
	05.02 Summarize the following security features:	
	05.02.1	Wireless encryption.
	05.02.2	Malicious software protection.
	05.02.3	BIOS Security.
	05.02.4	Password management/password complexity.
	05.02.5	Locking workstation.
	05.02.6	Biometrics.

06.0	Explain the basic physical security elements of a network. – The student will be able to:	
	06.01 Explain the basic software security elements of a network, including firewalls, IDS and IPS.	
	06.02 Explain how the human element plays a major role in network security, including social engineering.	
07.0	Demonstrate proficiency with operational procedure. – The student will be able to:	
	07.01 Outline the purpose of appropriate safety and environmental procedures and given a scenario apply them.	
	07.02 Given a scenario, demonstrate the appropriate use of communication skills and professionalism in the workplace including chain of custody.	
	07.03 Explain chain of custody for various scenarios.	
08.0	Demonstrate language arts knowledge and skills. – The student will be able to:	
	08.01 Locate, comprehend and evaluate key elements of oral and written information.	
	08.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.	
	08.03 Present information formally and informally for specific purposes and audiences.	
09.0	Demonstrate mathematics knowledge and skills. – The student will be able to:	
	09.01 Demonstrate knowledge of arithmetic operations.	
	09.02 Analyze and apply data and measurements to solve problems and interpret documents.	
	09.03 Construct charts/tables/graphs using functions and data.	
10.0	Demonstrate proficiency with installing, configuring, and troubleshooting personal computer hardware. – The student will be able to:	
	10.01 Install, configure and maintain personal computer components.	
	10.02 Detect problems, troubleshoot and repair/replace personal computer components.	
	10.03 Install, configure, detect problems, troubleshoot and repair/replace laptop components.	
	10.04 Select and use the following tools:	
		10.04.1 Multimeter.
		10.04.2 Power supply tester.
		10.04.3 Specialty hardware/tools.
		10.04.4 Cable testers.
		10.04.5 Loop back plugs.

	10.04.6	Anti-static pad and wrist strap.
	10.04.7	Extension magnet.
	10.04.8	Detect and resolve common printer issues.
11.0	Demonstrate proficiency with troubleshooting operating systems. – The student will be able to:	
	11.01	Select the appropriate commands and options to troubleshoot and resolve problems.
	11.02	Differentiate between Windows Operating System directory structures (Windows 2000, XP, Vista, and Windows 7).
	11.03	Given a scenario, select and use system utilities/tools and evaluate the results.
	11.04	Evaluate and resolve common issues.
12.0	Demonstrate proficiency with networking. – The student will be able to:	
	12.01	Troubleshoot client-side connectivity issues using appropriate tools.
	12.02	Install and configure a small office home office (SOHO) network.
13.0	Demonstrate proficiency with security. – The student will be able to:	
	13.01	Given a scenario, prevent, troubleshoot and remove viruses and malware.
	13.02	Implement security and troubleshoot common issues.
14.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:	
	14.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	14.02	Locate, organize and reference written information from various sources.
	14.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	14.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.
	14.05	Apply active listening skills to obtain and clarify information.
	14.06	Develop and interpret tables and charts to support written and oral communications.
	14.07	Exhibit public relations skills that aid in achieving customer satisfaction.
15.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:	
	15.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.
	15.02	Employ critical thinking and interpersonal skills to resolve conflicts.

	15.03 Identify and document workplace performance goals and monitor progress toward those goals.
	15.04 Conduct technical research to gather information necessary for decision-making.
16.0	Use information technology tools. – The student will be able to:
	16.01 Use personal information management (PIM) applications to increase workplace efficiency.
	16.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	16.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	16.04 Employ collaborative/groupware applications to facilitate group work.
17.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
	17.01 Describe the nature and types of business organizations.
	17.02 Explain the effect of key organizational systems on performance and quality.
	17.03 List and describe quality control systems and/or practices common to the workplace.
	17.04 Explain the impact of the global economy on business organizations.
18.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	18.01 Evaluate and justify decisions based on ethical reasoning.
	18.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	18.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	18.04 Interpret and explain written organizational policies and procedures.
	18.05 Explain various types of software licensing.

Course Number: CTS0083 **Occupational Completion Point: B** **Computer Network Technician – 150 Hours – SOC Code 15-1142**
19.0 Describe the operation of data networks. – The student will be able to:
19.01 Explain how multiple networks are used in everyday life.
19.02 Explain the topologies and devices used in a small-to-medium-sized business network.
19.03 Explain the basic characteristics of a network that supports communication in a small-to-medium-sized business.
19.04 Explain trends in networking that will affect the use of networks in small-to-medium-sized businesses.
19.05 Explain the purpose of the IOS.
19.06 Explain how to access and navigate the IOS to configure network devices.
19.07 Describe the command structure of the IOS software.
19.08 Configure hostnames on an IOS device using the CLI.
19.09 Use IOS commands to limit access to device configurations.
19.10 Use IOS commands to save the running configuration.
19.11 Explain how devices communicate across network media.
19.12 Configure a host device with an IP address.
20.0 Verify connectivity between two end devices. – The student will be able to:
20.01 Explain how rules are used to facilitate communication.
20.02 Explain the role of protocols and standards organizations in facilitating interoperability in network communications.
20.03 Explain how devices on a LAN access resources in a small to medium-sized business network.
20.04 Identify device connectivity options.
20.05 Describe the purpose and functions of the physical layer in the network.
20.06 Describe basic principles of the physical layer standards.
20.07 Identify the basic characteristics of copper cabling.
20.08 Build a UTP cable used in Ethernet networks.

	20.09 Describe fiber-optic cabling and its main advantages over other media.
	20.10 Describe wireless media.
	20.11 Select the appropriate media for a given requirement and connect devices.
	20.12 Describe the operation of the Ethernet sub layers.
	20.13 Identify the major fields of the Ethernet frame.
	20.14 Describe the purpose and characteristics of the Ethernet MAC address.
	20.15 Describe the purpose of ARP.
	20.16 Explain how ARP requests impact network and host performance.
	20.17 Explain basic switching concepts.
	20.18 Compare fixed configuration and modular switches.
21.0	Configure a Layer 3 switch. – The student will be able to:
	21.01 Explain how network layer protocols and services support communications across data networks.
	21.02 Explain how routers enable end-to-end connectivity in a small to medium-sized business network.
	21.03 Determine the appropriate device to route traffic in a small to medium-sized business network.
22.0	Configure a router with basic configurations. – The student will be able to:
	22.01 Describe the purpose of the transport layer in managing the transportation of data in end-to-end communication.
	22.02 Describe characteristics of the TCP and UDP protocols, including port numbers and their uses.
	22.03 Explain how TCP session establishment and termination processes facilitate reliable communication.
	22.04 Explain how TCP protocol data units are transmitted and acknowledged to guarantee delivery.
	22.05 Explain the UDP client processes to establish communication with a server.
	22.06 Determine whether high-reliability TCP transmissions, or non-guaranteed UDP transmissions, are best suited for common applications.
	22.07 Describe the structure of an IPv4 address.
	22.08 Describe the purpose of the subnet mask.
	22.09 Compare the characteristics and uses of the unicast, broadcast, and multicast IPv4 addresses.

22.10	Compare the use of public address space and private address space.
22.11	Explain the need for IPv6 addressing.
22.12	Describe the representation of an IPv6 address.
22.13	Describe types of IPv6 network addresses.
22.14	Configure global unicast addresses.
22.15	Describe multicast addresses.
22.16	Describe the role of ICMP in an IP network. (Include IPv4 and IPv6.)
22.17	Use ping and trace route utilities to test network connectivity.
22.18	Explain why routing is necessary for hosts on different networks to communicate.
22.19	Describe IP as a communication protocol used to identify a single device on a network.
22.20	Given a network and a subnet mask, calculate the number of host addresses available.
22.21	Calculate the necessary subnet mask in order to accommodate the requirements of a network.
22.22	Describe the benefits of variable length subnet masking (VLSM).
23.0	Explain how IPv6 address assignments are implemented in a business network. – The student will be able to:
23.01	Explain how the functions of the application layer, session layer, and presentation layer work together to provide network services to end user applications.
23.02	Describe how common application layer protocols interact with end user applications.
23.03	Describe, at a high level, common application layer protocols that provide Internet services to end-users, including WWW services and email.
23.04	Describe application layer protocols that provide IP addressing services, including DNS and DHCP.
23.05	Describe the features and operation of well-known application layer protocols that allow for file sharing services, including FTP, File Sharing Services, SMB protocol.
24.0	Explain how data is moved across the network, from opening an application, to receiving data. – The student will be able to:
24.01	Identify the devices and protocols used in a small network.
24.02	Explain how a small network serves as the basis of larger networks.
24.03	Describe the need for basic security measures on network devices.

	24.04 Identify security vulnerabilities and general mitigation techniques.
	24.05 Configure network devices with device hardening features to mitigate security threats.
	24.06 Use the output of ping and trace commands to establish relative network performance.
25.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	25.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	25.02 Explain emergency procedures to follow in response to workplace accidents.
	25.03 Create a disaster and/or emergency response plan.
26.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	26.01 Employ leadership skills to accomplish organizational goals and objectives.
	26.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	26.03 Conduct and participate in meetings to accomplish work tasks.
	26.04 Employ mentoring skills to inspire and teach others.
27.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	27.01 Identify and demonstrate positive work behaviors needed to be employable.
	27.02 Develop personal career plan that includes goals, objectives, and strategies.
	27.03 Examine licensing, certification, and industry credentialing requirements.
	27.04 Maintain a career portfolio to document knowledge, skills, and experience.
	27.05 Evaluate and compare employment opportunities that match career goals.
	27.06 Identify and exhibit traits for retaining employment.
	27.07 Identify opportunities and research requirements for career advancement.
	27.08 Research the benefits of ongoing professional development.
	27.09 Examine and describe entrepreneurship opportunities as a career planning option.

Course Number: CTS0084 **Occupational Completion Point: C** **Computer Networking Specialist – 150 Hours – SOC Code 15-1142**
28.0 Describe a switched network. – The student will be able to:
28.01 Describe convergence of data, voice, and video in the context of switched networks.
28.02 Describe a switched network in a small-to-medium-sized business.
28.03 Explain the process of frame forwarding in a switched network.
29.0 Compare a collision domain to a broadcast domain. – The student will be able to:
29.01 Explain the advantages and disadvantages of static routing.
29.02 Configure initial settings on a Cisco switch.
29.03 Configure switch ports to meet network requirements.
29.04 Configure the management switch virtual interface.
29.05 Describe basic security attacks in a switched environment.
29.06 Describe security best practices in a switched environment.
29.07 Configure the port security feature to restrict network access.
29.08 Explain the purpose of VLANs in a switched network.
29.09 Analyze how a switch forwards frames based on VLAN configuration in a multi-switched environment.
29.10 Configure a switch port to be assigned to a VLAN based on requirements.
29.11 Configure a trunk port on a LAN switch.
29.12 Configure Dynamic Trunk Protocol (DTP).
29.13 Troubleshoot VLAN and trunk configurations in a switched network.
29.14 Configure security features to mitigate attacks in a VLAN-segmented environment.
29.15 Explain security best practices for a VLAN-segmented environment.
29.16 Configure a router to route between multiple directly connected networks.
29.17 Describe the primary functions and features of a router.

	29.18 Explain how routers use information in data packets to make forwarding decisions in a small- to medium-sized business network.
	29.19 Explain the encapsulation and de-encapsulation process used by routers when switching packets between interfaces.
	29.20 Compare ways in which a router builds a routing table when operating in a small- to medium-sized business network.
	29.21 Explain routing table entries for directly connected networks.
	29.22 Explain how a router builds a routing table of directly connected networks.
	29.23 Describe the three primary options for enabling inter-VLAN routing.
	29.24 Configure legacy inter-VLAN routing.
	29.25 Configure router-on-a-stick inter-VLAN routing.
	29.26 Troubleshoot common inter-VLAN configuration issues.
	29.27 Troubleshoot common IP addressing issues in an inter-VLAN-routed environment.
	29.28 Configure inter-VLAN routing using Layer 3 switching.
30.0	Troubleshoot inter-VLAN routing in a Layer 3-switched environment. – The student will be able to:
	30.01 Explain the advantages and disadvantages of static routing.
	30.02 Explain the purpose of different types of static routes.
	30.03 Configure IPv4 and IPv6 static routes by specifying a next-hop address.
	30.04 Configure an IPv4 and IPv6 default routes.
	30.05 Explain the use of legacy classful addressing in network implementation.
	30.06 Explain the purpose of CIDR in replacing classful addressing.
	30.07 Explain the basic operation of dynamic routing protocols.
	30.08 Compare and contrast dynamic and static routing.
	30.09 Determine which networks are available during an initial network discovery phase.
	30.10 Define the different categories of routing protocols.
	30.11 Describe the process by which distance vector routing protocols learn about other networks.
	30.12 Identify the types of distance-vector routing protocols.

	30.13 Configure the RIP routing protocol.
	30.14 Configure the RIPng routing protocol.
	30.15 Explain the process by which link-state routing protocols learn about other networks.
	30.16 Explain the process by which link-state routers learn about other networks.
	30.17 Describe the types of packets used by Cisco IOS routers to establish and maintain an OSPF network.
	30.18 Explain how Cisco IOS routers achieve convergence in an OSPF network.
	30.19 Configure an OSPF router ID.
	30.20 Configure single-area OSPFv2 in a small, routed IPv4 network.
	30.21 Explain how OSPF uses cost to determine best path.
	30.22 Verify single-area OSPFv2 in a small, routed network.
	30.23 Compare the characteristics and operations of OSPFv2 to OSPFv3.
	30.24 Configure single-area OSPFv3 in a small, routed network.
	30.25 Verify single-area OSPFv3 in a small, routed network.
31.0	Configure ACLs. – The student will be able to:
	31.01 Explain how ACLs are used to filter traffic.
	31.02 Compare standard and extended IPv4 ACLs.
	31.03 Explain how ACLs use wildcard masks.
	31.04 Explain the guidelines for creating ACLs.
	31.05 Explain the guidelines for placement of ACLs.
	31.06 Configure standard IPv4 ACLs to filter traffic according to networking requirements.
	31.07 Modify a standard IPv4 ACL using sequence numbers.
	31.08 Configure a standard ACL to secure vty access.
32.0	Configure DHCPv4. – The student will be able to:
	32.01 Describe the operation of DHCPv4 in a small-to-medium-sized business network.
	32.02 Configure a router as a DHCPv4 server.

32.03	Configure a router as a DHCPv4 client.
32.04	Troubleshoot a DHCP configuration for IPv4 in a switched network.
32.05	Explain the operation of DHCPv6.
32.06	Configure a stateless DHCPv6 for a small-to-medium-sized business.
32.07	Configure a stateful DHCPv6 for a small-to-medium-sized business.
32.08	Troubleshoot a DHCP configuration for IPv6 in a switched network.
33.0	Configure NAT. – The student will be able to:
33.01	Describe NAT characteristics.
33.02	Describe the benefits and drawbacks of NAT.
33.03	Configure static NAT using the CLI.
33.04	Configure dynamic NAT using the CLI.
33.05	Configure PAT using the CLI.
33.06	Configure port forwarding using the CLI.
33.07	Configure NAT64.
33.08	Use show commands to verify NAT operation.

Course Number: CTS0069 **Occupational Completion Point: D** **Computer Security Technician – 300 Hours – SOC Code 15-1122**	
34.0	Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends. – The student will be able to:
34.01	Describe the history of cybersecurity, including the evolution of a hacker culture.
34.02	Discuss the trends and national initiatives related to cybersecurity.
34.03	Distinguish between information assurance and cybersecurity.
34.04	Describe the concepts of confidentiality as it relates to user and data impact.
34.05	Explain authentication and the concept of non-repudiation.
34.06	Describe the concept of “Hacking - The Human Element” and elaborate on its implications to cybersecurity.
35.0	Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:
35.01	Identify and understand different viruses.
35.02	Identify and understand different Trojan Horses.
35.03	Identify and understand different Logic Bombs.
35.04	Identify and understand different Worms, Spyware, Adware & RootKit.
36.0	Recognize and be able to differentiate and explain the following access control models. – The student will be able to:
36.01	Recognize and define MAC (Mandatory Access Control).
36.02	Recognize and define DAC (Discretionary Access Control).
36.03	Recognize and define RBAC (Role Based Access Control).
37.0	Recognize and be able to differentiate and explain the following methods of authentication. – The student will be able to:
37.01	Identify and define Kerberos.
37.02	Identify and define Certificates.
37.03	Identify and define Username/Password.
37.04	Identify and define Identify and define Tokens.
37.05	Identify and define Multi-factor.

	37.06 Identify and define Mutual.
	37.07 Identify and define Biometrics.
38.0	Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:
	38.01 Recognize and define DOS/DDOS (Denial of Service/Distributed Denial of Service).
	38.02 Recognize and define Back Door.
	38.03 Recognize and define Spoofing.
	38.04 Recognize and define Man in the Middle.
	38.05 Recognize and define Replay.
	38.06 Recognize and define TCP/IP Hijacking.
	38.07 Recognize and define Weak Keys.
	38.08 Recognize and define Mathematical.
	38.09 Recognize and define Social Engineering.
	38.10 Recognize and define Birthday.
	38.11 Recognize and define Password Guessing (e.g., Brute Force, Dictionary).
	38.12 Recognize and define Software Exploitation.
39.0	Recognize and understand the processes and risks associated with the following security concerns and tasks. – The student will be able to:
	39.01 Identify non-essential services and protocols and know what actions to take to reduce the risks of those services and protocols.
	39.02 Understand the concept of and know how reduce the risks of social engineering.
	39.03 Understand the concept and significance of auditing, logging and system scanning.
	39.04 Identify and be able to differentiate different cryptographic standards and protocols.
40.0	Recognize and understand the administration of the following types of remote access technologies. – The student will be able to:
	40.01 Recognize and define 802.1x.
	40.02 Recognize and define RADIUS (Remote Authentication Dial-In User Service).
	40.03 Recognize and define TACACS (Terminal Access Controller Access Control System).

	40.04 Recognize and define L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).
	40.05 Recognize and define SSH (Secure Shell).
	40.06 Recognize and define IPSEC (Internet Protocol Security).
	40.07 Recognize and define Vulnerabilities.
41.0	Recognize and understand the administration of the following email security concepts. – The student will be able to:
	41.01 Recognize and define S/MIME (Secure Multipurpose Internet Mail Extensions).
	41.02 Recognize and define PGP (Pretty Good Privacy) like technologies.
	41.03 Recognize and define Vulnerabilities.
	41.04 Recognize and define SPAM.
	41.05 Recognize and define Hoaxes.
42.0	Recognize and understand the administration of the following Internet security concepts. – The student will be able to:
	42.01 Recognize and define SSL/TLS (Secure Sockets Layer/Transport Layer Security).
	42.02 Recognize and define HTTP/S (Hypertext Transfer Protocol/Hypertext Transfer Protocol over Secure Sockets Layer).
	42.03 Recognize and define Instant Messaging (i.e., Vulnerabilities, Packet Sniffing, Privacy).
43.0	Recognize and understand the administration of the following vulnerabilities. – The student will be able to:
	43.01 Recognize and define Java Script.
	43.02 Recognize and define ActiveX.
	43.03 Recognize and define Buffer Overflows.
	43.04 Recognize and define Cookies.
	43.05 Recognize and define Signed Applets.
	43.06 Recognize and define CGI (Common Gateway Interface).
	43.07 Recognize and define SMTP (Simple Mail Transfer Protocol) Relay.
44.0	Recognize and understand the administration of the following directory security concepts. – The student will be able to:
	44.01 Recognize and define SSL/TLS (Secure Sockets Layer/Transport Layer Security).
	44.02 Recognize and define LDAP (Lightweight Directory Access Protocol).

45.0	Recognize and understand the administration of the following file transfer protocols and concepts. – The student will be able to:
	45.01 Recognize and define S/FTP (File Transfer Protocol).
	45.02 Recognize and define Blind FTP (File Transfer Protocol)/Anonymous.
	45.03 Recognize and define File Sharing.
	45.04 Recognize and define Vulnerabilities (i.e., packet sniffing, naming conventions).
46.0	Recognize and understand the administration of the following wireless technologies and concepts. – The student will be able to:
	46.01 Recognize and define WTLS (Wireless Transport Layer Security).
	46.02 Recognize and define 802.11 and 802.11x.
	46.03 Recognize and define Vulnerabilities (i.e., site surveys).
47.0	Compare and contrast the following types of intrusion detection in terms of implementation and configuration. – The student will be able to:
	47.01 Compare and contrast Network Based – Active and Passive.
	47.02 Compare and contrast Host Based – Active and Passive.
	47.03 Compare and contrast Honey Pots.
	47.04 Compare and contrast Recognize and define Incident Response.
48.0	Be able to identify and explain the following different kinds of cryptographic algorithms. – The student will be able to:
	48.01 Recognize and define Hashing.
	48.02 Recognize and define Symmetric.
	48.03 Recognize and define Asymmetric.
49.0	Understand how cryptography and digital signatures address the following security concepts. – The student will be able to:
	49.01 Recognize and define Confidentiality.
	49.02 Recognize and define Integrity.
	49.03 Recognize and define Authentication.
	49.04 Recognize and define Non-Repudiation.
	49.05 Recognize and define Access Control.

50.0	Understand and be able to explain the following concepts of PKI (Public Key Infrastructure). – The student will be able to:
50.01	Recognize and define Certificates (e.g., policies, practice statements).
50.02	Recognize and define Revocation.
50.03	Recognize and define Trust Models.
51.0	Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles. – The student will be able to:
51.01	Understand Centralized versus Decentralized.
51.02	Understand Hardware versus software key storage.
51.03	Understand Private key storage.
51.04	Understand Escrow.
51.05	Understand Expiration.
51.06	Understand Revocation versus suspension (e.g., status checking).
51.07	Understand Recovery authorization schema (e.g., M-of-N Control - Of M appropriate individuals, N must be present to authorize recovery).
51.08	Understand Renewal.
51.09	Understand Destruction.
51.10	Understand Key Usage.
51.11	Understand Multiple Key Pairs (Single, Dual).
52.0	Understand the application of the following concepts of physical security. – The student will be able to:
52.01	Define Access Control (e.g., physical barriers, biometrics).
52.02	Define Social Engineering.
52.03	Defines issues related to Environment (e.g., wireless cells, location, shielding, fire suppression).
53.0	Understand security concerns and concepts of the following types of devices. – The student will be able to:
53.01	Recognize, define, and configure Firewalls.
53.02	Recognize, define, and configure Routers.
53.03	Recognize, define, and configure Switches.

	53.04 Recognize, define, and configure Wireless.
	53.05 Recognize, define, and configure Modems.
	53.06 Recognize, define, and configure RAS (Remote Access Server).
	53.07 Recognize, define, and configure Telecom/PBX (Private Branch Exchange).
	53.08 Recognize, define, and configure VPN (Virtual Private Network).
	53.09 Recognize, define, and configure IDS (Intrusion Detection System).
	53.10 Recognize, define, and configure Network Monitoring/Diagnostics.
	53.11 Recognize, define, and configure Workstations.
	53.12 Recognize, define, and configure Servers.
	53.13 Recognize, define, and install Mobile Devices.
54.0	Understand the security concerns for the following types of media. – The student will be able to:
	54.01 Recognize, define, and install Coaxial Cable.
	54.02 Recognize, define, and install UTP/STP (Unshielded Twisted Pair/Shielded Twisted Pair).
	54.03 Recognize, define, and install Recognize, define, and install Fiber Optic Cable.
	54.04 Recognize, define, and install Removable Media.
	54.05 Recognize, define, and install Magnetic Tape.
	54.06 Recognize, define, and install CD-R (Recordable Compact Disks).
	54.07 Recognize, define, and install Hard Drives.
	54.08 Recognize, define, and install Diskettes.
	54.09 Recognize, define, and install Flashcards.
	54.10 Recognize, define, and install Smartcards.
55.0	Explain the following security topologies as they relate to cybersecurity. – The student will be able to:
	55.01 Recognize and define Security Zones.
	55.02 Recognize and define DMZ (Demilitarized Zone).

	55.03 Recognize and define Intranet.
	55.04 Recognize and define Extranet.
	55.05 Recognize and define VLANs (Virtual Local Area Network).
	55.06 Recognize and define NAT (Network Address Translation).
	55.07 Recognize and define Tunneling.
56.0	Implement the process of network system hardening within a computer network. – The student will be able to:
	56.01 Install and configure Updates (Firmware & Software).
	56.02 Install and configure Operating System.
	56.03 Complete Configuration.
	56.04 Enabling and Disabling Services and Protocols.
	56.05 Install and configure Access Control Lists.
57.0	Implement the process of server application/service hardening within a computer network. – The student will be able to:
	57.01 Setup and configure Updates (Hotfixes, Service Packs, Patches).
	57.02 Setup and configure Web Servers.
	57.03 Setup and configure E-mail Servers.
	57.04 Setup and configure FTP (File Transfer Protocol) Servers.
	57.05 Setup and configure DNS (Domain Name Service) Servers.
	57.06 Setup and configure NNTP (Network News Transfer Protocol) Servers.
	57.07 Setup and configure File/Print Servers.
	57.08 Setup and configure DHCP (Dynamic Host Configuration Protocol) Servers.
	57.09 Setup and configure Data Repositories.
	57.10 Setup and configure Directory Services.
	57.11 Setup and configure Databases.

58.0	Describe the security implications of the following topics of disaster recovery options. – The student will be able to:
58.01	Define and use Backups (On-site versus off-site storage).
58.02	Define Secure Recovery.
58.03	Define Alternate Sites.
58.04	Disaster Recovery Plan.
59.0	Understand the security implications of the following topics of business continuity. – The student will be able to:
59.01	Recognize and define Utilities.
59.02	Recognize and define High Availability/Fault Tolerance.
59.03	Recognize and define Backups.
60.0	Demonstrate proficiency in applying the concepts and uses of the following types of policies and procedures. – The student will be able to:
60.01	Demonstrate proficiency and understanding of Security Policy.
60.02	Demonstrate proficiency and understanding of Acceptable Use.
60.03	Demonstrate proficiency and understanding of Due Care.
60.04	Demonstrate proficiency and understanding of Privacy.
60.05	Demonstrate proficiency and understanding of Separation of Duties.
60.06	Demonstrate proficiency and understanding of Need to Know.
60.07	Demonstrate proficiency and understanding of Password Management.
60.08	Demonstrate proficiency and understanding of SLAs (Service Level Agreements).
60.09	Demonstrate proficiency and understanding of Disposal/Destruction.
60.10	Demonstrate proficiency and understanding of HR policies related to passwords, privileges, and Code of Ethics in hiring and termination situations.
60.11	Demonstrate proficiency and understanding of Incident Response Policy.
61.0	Explain the following concepts of privilege management. – The student will be able to:
61.01	Define User/Group/Role Management.
61.02	Define Single Sign-on.

	61.03 Define Centralized vs. Decentralized.
	61.04 Define Auditing (Privilege, Usage, Escalation).
	61.05 Define MAC/DAC/RBAC (Mandatory Access Control/Discretionary Access Control/Role Based Access Control).
62.0	Demonstrate an understanding of the concepts of the following topics of forensics. – The student will be able to:
	62.01 Identify Chain of Custody.
	62.02 Identify Preservation of Evidence.
	62.03 Identify Collection of Evidence.
63.0	Understand and be able to explain the following concepts of risk identification. – The student will be able to:
	63.01 Define Asset Identification.
	63.02 Define Risk Assessment.
	63.03 Define Threat Identification.
	63.04 Define Vulnerabilities.
64.0	Understand the security relevance of the education and training of end users, executives and human resources. – The student will be able to:
	64.01 Understand importance of Communication.
	64.02 Understand importance of User Awareness.
	64.03 Understand importance of Education.
	64.04 Understand importance of On-line Resources.
65.0	Explain the following documentation and their role in cybersecurity. – The student will be able to:
	65.01 Explain Standards and Guidelines.
	65.02 Explain Systems Architecture.
	65.03 Explain Change Documentation.
	65.04 Explain Logs and Inventories.
	65.05 Explain Classification/Notification Schema.
	65.06 Explain Retention/Storage.
	65.07 Explain Destruction.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Applied Cybersecurity**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y100300
CIP Number	0511100302
Grade Level	9-12, 30, 31
Standard Length	750 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 CYBER TECH 7G INFO TECH 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and cybersecurity-related careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of cybersecurity.

The content includes but is not limited to foundational knowledge and skills in computer and network security, security vulnerabilities, attack mechanisms and techniques, intrusion detection and prevention, cryptographic systems, system hardening, risk identification, incidence response, penetration testing, key management, access control, and recovery. Specialized courses focus on database security, planning and analysis, software, and web security.

Additional Information relevant to this Career and Technology (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points (OCPs). To complete this program, students must complete OCP A plus one of the subsequent courses in OCP B.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	CTS0018	Cybersecurity Associate	600 hours	15-1122
B	CTS0019	Information Security Manager	150 hours	15-1122
	or	**or**		
	CTS0021	Data Security Specialist	150 hours	
	or	**or**		
	CTS0060	Software Security Specialist	150 hours	
	or	**or**		
	CTS0085	Web Security Specialist	150 hours	
	or	**or**		
	CTS0089	Information Security Administrator	150 hours	

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of computer systems.
02.0 Demonstrate knowledge of different operating systems.
03.0 Develop a familiarity with the information technology industry.
04.0 Develop an awareness of microprocessors and digital computers.
05.0 Develop an awareness of programming languages.
06.0 Develop an awareness of emerging technologies.
07.0 Demonstrate an understanding of the Open Systems Interface (OSI) model.
08.0 Identify computer components and their functions.
09.0 Demonstrate proficiency using the Internet to locate information.
10.0 Demonstrate an understanding of Internet safety and ethics.
11.0 Demonstrate proficiency using Hypertext Markup Language (HTML).
12.0 Demonstrate proficiency in webpage design.
13.0 Demonstrate proficiency using common software applications.
14.0 Perform email activities.
15.0 Demonstrate proficiency in using presentation software and equipment.
16.0 Perform decision-making activities in a multimedia environment.
17.0 Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications.
18.0 Describe the national agencies and supporting initiatives involved in cybersecurity.
19.0 Discuss the underlying concepts of terms used in cybersecurity.
20.0 Demonstrate an understanding of basic computer components, their functions, and their operation.
21.0 Demonstrate knowledge of different operating systems.
22.0 Demonstrate an understanding of the Open Systems Interface (OSI) model.
23.0 Describe the services and protocols that operate in the application, transport, network, and link layers of the OSI Model.
24.0 Demonstrate proficiency using computer networks.
25.0 Demonstrate an understanding of basic security concepts.
26.0 Demonstrate an understanding of legal and ethical issues in cybersecurity.
27.0 Demonstrate an understanding of virtualization technology.
28.0 Recognize and understand the administration of the following types of remote access technologies.
29.0 Understand the application of the following concepts of physical security.
30.0 Understand security concerns and concepts of the following types of devices.
31.0 Recognize and be able to differentiate and explain the following access control models.
32.0 Understand the security concerns for the following types of media.
33.0 Explain the following security topologies as they relate to cybersecurity.
34.0 Demonstrate an understanding of the technical underpinnings of cybersecurity and its taxonomy, terminology, and challenges.
35.0 Demonstrate an understanding of common information and computer system security vulnerabilities.
36.0 Demonstrate an understanding of common cyber attack mechanisms, their consequences, and motivation for their use.
37.0 Be able to identify and explain the following different kinds of cryptographic algorithms.
38.0 Demonstrate an understanding of the following kinds of steganographic techniques and their use in cybersecurity.

39.0 Understand how cryptography and digital signatures address the following security concepts.
40.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure).
41.0 Demonstrate an understanding of certificates and their role in cybersecurity.
42.0 Demonstrate an understanding of intrusion, the types of intruders, their techniques, and their motivation.
43.0 Demonstrate an understanding of Intrusion Detection Systems (IDS).
44.0 Describe host-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature).
45.0 Describe network-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature).
46.0 Demonstrate an understanding of IDS applications.
47.0 Demonstrate an understanding of port scanning and network traffic monitoring employed as intrusion detection techniques.
48.0 Demonstrate an understanding of firewalls and other means of intrusion prevention.
49.0 Demonstrate an understanding of vulnerabilities unique to virtual computing environments.
50.0 Demonstrate an understanding of social engineering and its implications to cybersecurity.
51.0 Demonstrate an understanding of fundamental security design principles and their role in limiting points of vulnerability.
52.0 Demonstrate an understanding of how to configure host systems to guard against cyber intrusion.
53.0 Demonstrate an understanding of authentication methods and strategies.
54.0 Demonstrate an understanding of methods and strategies for controlling access to computer networks.
55.0 Demonstrate an understanding of key network services, their operation, vulnerabilities, and ways in which they may be secured.
56.0 Demonstrate an understanding of the processes involved in hardening a computer system or network.
57.0 Demonstrate an understanding of Public Key Infrastructure (PKI) management functions, key states, and life cycle/transition considerations.
58.0 Demonstrate an understanding of the processes associated with assessing vulnerabilities and risks within an organization.
59.0 Demonstrate an understanding of penetration testing, the types of tests and metrics, testing methodologies, and reporting processes.
60.0 Demonstrate an understanding of the Incident Response Life Cycle and the activities comprising each phase.
61.0 Demonstrate proficiency in cybersecurity risk mitigation planning.
62.0 Demonstrate proficiency in establishing a risk management framework.
63.0 Demonstrate proficiency in creating a corporate security policy.
64.0 Demonstrate proficiency in addressing process risks.
65.0 Demonstrate proficiency in addressing physical security risks.
66.0 Demonstrate proficiency in cybersecurity contingency planning.
67.0 Demonstrate proficiency in cybersecurity disaster recovery planning.
68.0 Demonstrate proficiency in cybersecurity business continuity planning.
69.0 Demonstrate proficiency in the essential elements of forensic analysis.
70.0 Demonstrate an understanding of database design, structure, and operation.
71.0 Demonstrate a fundamental understanding of Structured Query Language (SQL).
72.0 Demonstrate an understanding of database security policies.
73.0 Demonstrate an understanding of database access control, functions, methods, and verification.
74.0 Demonstrate an understanding of database vulnerabilities, attack vectors, and associated countermeasures.
75.0 Demonstrate an understanding of pre- and post-intrusion actions to facilitate database recovery.
76.0 Demonstrate an understanding of software design, structure, and operation.
77.0 Demonstrate a fundamental understanding of common software attack vectors.
78.0 Demonstrate an understanding input syntax validation.
79.0 Demonstrate an understanding of best practices for processing input data to ensure safe and secure program code.
80.0 Demonstrate an understanding of the role of environment variables in the operation of software applications.

81.0 Demonstrate an understanding of program design strategies for inhibiting elevated privilege attacks.
82.0 Demonstrate an understanding of the primary security services used in Internet and intranet environments.
83.0 Demonstrate a fundamental understanding of the SSL protocol stack and its elements.
84.0 Demonstrate an understanding of IPSec, including its uses, elements, and mechanisms.
85.0 Demonstrate an understanding of S/MIME, including its uses, functions, cryptographic algorithms, and key certificates.
86.0 Demonstrate an understanding of Kerberos and its role in third-part authentication in a distributed network.
87.0 Demonstrate an understanding of identity management and ways in which secure identify information is exchanged across different domains.
88.0 Complete a safety skills inventory.
89.0 Demonstrate acceptable project values.
90.0 Demonstrate the ability to detect and resolve system vulnerabilities.
91.0 Plan, organize, and carry out a penetration testing plan.
92.0 Demonstrate proficiency in conducting forensic analysis.
93.0 Successfully work as a member of a team.
94.0 Manage time according to a plan.
95.0 Keep acceptable records of progress problems and solutions.
96.0 Manage resources.
97.0 Use tools, materials, and processes in an appropriate and safe manner.
98.0 Research content related to the project and document the results.
99.0 Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience.
100.0 Demonstrate competency in the area of expertise related to the Applied Cybersecurity education program previously completed that this project is based upon.

Florida Department of Education
Student Performance Standards

Program Title: **Applied Cybersecurity**
PSAV Number: **Y100300**

Course Number: CTS0018 **Occupational Completion Point: A** **Cybersecurity Associate – 600 Hours – SOC Code 15-1122**
01.0 Demonstrate knowledge, skill, and application of computer systems. – The student will be able to:
01.01 Describe and use current and emerging computer technology and software to perform personal and business related tasks.
01.02 Describe the types of communications and networking systems used in workplace environments.
01.03 Locate and use software application reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals.
01.04 Troubleshoot problems with computer hardware peripherals.
01.05 Describe ethical, privacy, and security issues and problems associated with computers and information systems.
01.06 Demonstrate proficiency in using the basic features of GUI browsers.
02.0 Demonstrate knowledge of different operating systems. – The student will be able to:
02.01 Identify the most common computer operating systems.
02.02 Describe and use industry accepted file naming conventions, particularly in NTFS and FAT file systems.
02.03 Demonstrate proficiency with file management tasks (e.g., folder creation, file creation, backup, copy, delete, open, save).
02.04 Demonstrate a working knowledge of standard file formats.
02.05 Compare and contrast various operating systems (e.g., DOS, Windows, Mac, Linux).
02.06 Differentiate between different operating systems and applications.
02.07 Compare and contrast open source and proprietary software.
02.08 Explain how system utilities are used to maintain computer performance.
03.0 Develop a familiarity with the information technology industry. – The student will be able to:
03.01 Explain how information technology impacts the operation and management of business and society.

	03.02 Identify and describe the various ways of segmenting the IT industry (e.g., hardware vs. software, server vs. client, business vs. entertainment, stable vs. mobile).
	03.03 Describe how digital technologies (social media) are changing both work and personal lifestyles.
04.0	Develop an awareness of microprocessors and digital computers. – The student will be able to:
	04.01 Describe the evolution of the digital computer.
	04.02 Explain the general architecture of a microcomputer system.
	04.03 Explain the evolution of microprocessors.
	04.04 Explain software hierarchy and its impact on microprocessors.
	04.05 Explain the need for and use of peripherals.
	04.06 Demonstrate proficiency installing and using plug-and-play peripherals.
	04.07 Identify the basic concepts of computer maintenance and upgrades.
05.0	Develop an awareness of programming languages. – The student will be able to:
	05.01 Explain the evolution of programming languages.
	05.02 Explain the need for and use of compilers.
	05.03 Identify the three types of programming design approaches (e.g., top-down, structured, object-oriented).
	05.04 Compare the various types or classes of programming languages (e.g., compiled, interpretive).
	05.05 Differentiate among source code, machine code, interpreters, and compilers.
	05.06 Characterize the major categories of programming languages and how they are used.
	05.07 Create a model flowchart for a computer program.
	05.08 Describe the stages in the software development life cycle and explain how to successfully implement them.
06.0	Develop an awareness of emerging technologies. – The student will be able to:
	06.01 Compare and contrast emerging technologies and describe how they impact business in the global marketplace (e.g., wireless, wireless web, cell phones, portables/handhelds, smart appliances, home networks, peer-to-peer).
	06.02 Describe social media as an emerging technology.
	06.03 Adhere to published best practices for protecting personal identifiable information when using the Internet.
	06.04 Identify trends related to the use of information technology in people's personal and professional lives.
	06.05 Characterize how the rapid pace of change in information technology impacts our society.

07.0	Demonstrate an understanding of the Open Systems Interface (OSI) model. – The student will be able to:
07.01	Describe the evolution of OSI from its inception to the present and into the future.
07.02	Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.
07.03	Describe the purpose of the OSI model and each of its layers.
07.04	Explain specific functions belonging to each OSI model layer.
07.05	Understand how two network nodes communicate through the OSI model.
07.06	Discuss the structure and purpose of data packets and frames.
07.07	Describe the two types of addressing covered by the OSI model.
08.0	Identify computer components and their functions. – The student will be able to:
08.01	Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).
08.02	Use common computer and programming terminology.
09.0	Demonstrate proficiency using the Internet to locate information. – The student will be able to:
09.01	Identify and describe web terminology.
09.02	Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).
09.03	Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).
09.04	Trace the evolution of the Internet from its inception to the present and into the future.
09.05	Demonstrate proficiency using search engines, including Boolean search strategies.
09.06	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).
09.07	Compare and contrast the roles of web servers and web browsers.
10.0	Demonstrate an understanding of Internet safety and ethics. – The student will be able to:
10.01	Describe cyber-bullying and its impact on perpetrators and victims.
10.02	Differentiate between viruses and malware, specifically their sources, ploys, and impact on personal privacy and computer operation, and ways to avoid infection.
10.03	Describe risks associated with sexting, including related legal issues, social engineering aspects, prevention methods, and reporting of offenses.
10.04	Describe the risks associated with online gaming and ways to mitigate these risks.

10.05	Describe the ethics and copyright legalities of downloading music or videos from the Internet.
10.06	Describe risks associated with social networking sites (e.g., FaceBook, MySpace, Twitter) and ways to mitigate these risks.
10.07	Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.
11.0	Demonstrate proficiency using Hypertext Markup Language (HTML). – The student will be able to:
11.01	Categorize websites according to their purpose.
11.02	Describe the types of documents that might be used in a web environment (e.g., HTML, ASP, DHTML, XML, JS, CSS, PHP).
11.03	Identify elements of a webpage.
11.04	Define basic HTML terminology.
11.05	Critique the aesthetic and functional operation of sample websites.
11.06	Create storyboards depicting a multi-page website (e.g., linear, hierarchical).
11.07	Design, edit, and test HTML documents for accuracy and validity.
11.08	Create and modify webpages using a Graphical User Interface (GUI) editor.
11.09	Enhance webpages through the addition of images and graphics including animation.
11.10	Analyze webpage source code developed by others.
11.11	Create webpages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
12.0	Demonstrate proficiency in webpage design. – The student will be able to:
12.01	Develop an awareness of acceptable webpage design, including index pages in relation to the rest of the website.
12.02	Describe and apply color theory as it applies to webpage design (e.g., background, text color).
12.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
12.04	Use image design software to create and edit images.
12.05	Demonstrate proficiency in publishing to the Internet.
12.06	Explain the need for web-based applications.
13.0	Demonstrate proficiency using common software applications. – The student will be able to:
13.01	Compare and contrast the appropriate use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, email, presentation, database, scheduling, financial management, Java applet, music).
13.02	Demonstrate proficiency in the use of various software applications (e.g., word processing, desktop publishing, graphics design, web browser, email, presentation, database, scheduling, financial management, Java applet, music).

14.0	Perform email activities. – The student will be able to:
14.01	Describe email capabilities and functions.
14.02	Identify components of an email message.
14.03	Identify the components of an email address.
14.04	Identify when to use different email options.
14.05	Attach a file to an email message.
14.06	Forward an email message.
14.07	Use an address book.
14.08	Reply to an email message.
14.09	Use the Internet to perform email activities.
14.10	Identify the appropriate use of email and demonstrate related email etiquette.
14.11	Identify when to include information from an original email message in a response.
14.12	Identify common problems associated with widespread use of email.
15.0	Demonstrate proficiency in using presentation software and equipment. – The student will be able to:
15.01	Produce a presentation that includes music, animation, and digital photography and present it using a projection system.
15.02	Using presentation software, create a multimedia presentation that incorporates shot and edited video, animation, music, narration and adheres to good design principles, use of transitions, and effective message conveyance.
15.03	Demonstrate knowledge of the roles and responsibilities of a multimedia production team (e.g. project manager, creative or design director, content experts, writers, graphic designers, animators, sound designers, videographer, interface designers/programmers).
15.04	Collaborate with team members to plan, edit, evaluate, and present a multimedia presentation where individuals on the team function in specific production roles.
15.05	Create a self-running presentation with synchronized audio, convert presentation slides (e.g., PowerPoint) into streaming ASF files for use on the Web.
16.0	Perform decision-making activities in a multimedia environment. – The student will be able to:
16.01	Determine work priorities, the audience, project budgets, project specifications and the production schedule.
16.02	Evaluate and select appropriate software packages and multimedia tools to complete assigned tasks.
16.03	Present and defend design projects.
16.04	Evaluate criteria for selecting an operating system.

17.0	Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications. – The student will be able to:
	17.01 Define cybersecurity.
	17.02 Describe how information security evolved into cybersecurity and the impact of the Internet on the pace and nature of the evolution.
	17.03 Describe the individual elements that comprise the CIA triad (i.e., Confidentiality, Integrity, Availability).
	17.04 Define and explain the various types of hackers and the role each plays in cybersecurity.
	17.05 Describe various methodologies used by hackers and the basis for their employment.
18.0	Describe the national agencies and supporting initiatives involved in cybersecurity. – The student will be able to:
	18.01 Describe the role of the National Security Agency.
	18.02 Describe current trends in cyber attacks and strategies for combating them.
	18.03 Describe the legal implications of computer hacking and other forms of cyber attacks.
19.0	Discuss the underlying concepts of terms used in cybersecurity. – The student will be able to:
	19.01 Differentiate between cybersecurity and information assurance.
	19.02 Define confidentiality and give examples of security breaches.
	19.03 Define integrity and give examples of security breaches.
	19.04 Define authenticity and give examples of security breaches.
	19.05 Define accountability (non-repudiation) and give examples of security breaches.
20.0	Demonstrate an understanding of basic computer components, their functions, and their operation. – The student will be able to:
	20.01 Describe the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).
	20.02 Demonstrate and understanding of common computer and programming terminology.
	20.03 Explain the physical and logical architecture of a microcomputer system.
	20.04 Describe the file types used in the operation of a computer.
	20.05 Compare and contrast memory technologies (e.g., RAM, ROM, virtual memory, memory management).

21.0	Demonstrate knowledge of different operating systems. – The student will be able to:
21.01	Compare operating system file naming conventions.
21.02	Describe the common elements that comprise the architecture of an operating system (e.g., kernel, file manager, memory manager, device manager, network manager).
21.03	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
21.04	Demonstrate a working knowledge of standard file formats.
21.05	Describe the purpose of various operating systems (e.g., Windows, Mac, Unix/Linux).
21.06	Describe the difference between client and network operating systems.
21.07	Differentiate between different operating systems and applications.
21.08	Explain the basics of boot sequences, methods and startup utilities.
21.09	Compare and contrast open source and proprietary software.
21.10	Describe common system utilities used in performing computer maintenance.
22.0	Demonstrate an understanding of the Open Systems Interface (OSI) model. – The student will be able to:
22.01	Describe the evolution of OSI from its inception, to the present and into the future.
22.02	Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.
22.03	Describe the purpose of the OSI model and each of its layers.
22.04	Explain specific functions belonging to each OSI model layer.
22.05	Understand how two network nodes communicate through the OSI model.
22.06	Discuss the structure and purpose of data packets and frames.
22.07	Describe the two types of addressing covered by the OSI model.
23.0	Describe the services and protocols that operate in the application, transport, network, and link layers of the OSI Model. – The student will be able to:
23.01	Describe the services and protocols used in the OSI Application Layer (i.e., DHCP, DNS, FTP, HTTP, SMTP, Telnet, IMAP).
23.02	Describe the services and protocols used in the OSI Transport Layer (i.e., TCP, TSL/SSL, UDP).
23.03	Describe the services and protocols used in the OSI Network Layer (i.e., IP, ICMP, IGMP, IPSec).
23.04	Describe the services and protocols used in the OSI Link Layer (i.e., ARP, OSPF, L2TP, PPP).

24.0	Demonstrate proficiency using computer networks. – The student will be able to:
24.01	Define networking and describe the purpose of a network.
24.02	Describe the conceptual background of digital networks including terminology and basics.
24.03	Describe various types of networks and the advantages and disadvantages of each (e.g. peer to peer, client/server, mainframe/terminal).
24.04	Describe the use, advantages, and disadvantages of various network media (e.g. thinnet cable, coaxial, twisted pair (cat 5), fiber optics).
24.05	Describe the function of various network devices (e.g. hub, switched hub or switch, router bridge, gateway, access points).
24.06	Describe how network devices are identified (i.e., IP addressing).
24.07	Explain the protocols commonly used in a network environment.
24.08	Differentiate between public and private IP addresses.
24.09	Describe the common ports and corresponding protocols used in a network.
24.10	Describe the difference between the Internet and intranet.
24.11	Compare and contrast IP Version 6 and IP Version 4.
24.12	Compare and contrast the different methods for network connectivity (e.g. broadband, wireless, Bluetooth, cellular).
24.13	Discuss the differences between Local Area Network (LAN), Wide Area Network (WAN), Metropolitan Area Network (MAN), and Virtual Private Network (VPN).
25.0	Demonstrate an understanding of basic security concepts. – The student will be able to:
25.01	Distinguish between vulnerability and a threat.
25.02	Discuss the different types of attacks (e.g., active, passive).
25.03	Define security policy and explain its role in cybersecurity.
25.04	Describe the basic methods of authentication (e.g., password, biometrics, smart cards).
25.05	Describe the various forms of encryption methodologies (e.g., symmetric, asymmetric, block cipher, stream cipher).
25.06	Describe hash functions and their role in authentication.
25.07	Describe various method of access control used in computer security (e.g., policies, Groups, Access Control List (ACL)).

26.0	Demonstrate an understanding of legal and ethical issues in cybersecurity. – The student will be able to:
26.01	Define cyber crime and discuss the challenges facing law enforcement.
26.02	Identify the key legislative acts that impact cybersecurity.
26.03	Describe the Federal criminal code related to computers and give examples of cyber crimes and penalties, particularly those involving inappropriate access.
26.04	Discuss digital forensics and its role in cybersecurity.
26.05	Distinguish among the Intellectual Property Rights of trademark, patent, and copyright.
26.06	Explain digital rights management and the implications of the Digital Millennium Copyright Act.
26.07	Describe the implications of social media (e.g., MySpace, Facebook, Twitter) on the safeguarding of personal or sensitive information.
26.08	Describe various safeguards that can be employed to help ensure that sensitive or confidential information is not inadvertently divulged or obtained.
27.0	Demonstrate an understanding of virtualization technology. – The student will be able to:
27.01	Define virtual computing.
27.02	Explain the benefits of virtual computing.
27.03	Differentiate between guest and host operating systems.
27.04	Install desktop virtualization software.
27.05	Describe the role of the hypervisor.
27.06	Create and upgrade a virtual machine.
27.07	Optimize the performance of a virtual machine.
27.08	Preserve the state of a virtual machine.
27.09	Clone, move and share virtual machines.
27.10	Use virtual disks and disk drives.
27.11	Configure a virtual network.
27.12	Connect devices to a virtual machine.
27.13	Enable security settings on a virtual machine.

28.0	Recognize and understand the administration of the following types of remote access technologies. – The student will be able to:
28.01	802.1x.
28.02	VPN (Virtual Private Network).
28.03	RADIUS (Remote Authentication Dial-In User Service).
28.04	TACACS (Terminal Access Controller Access Control System).
28.05	L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).
28.06	SSH (Secure Shell).
28.07	IPSEC (Internet Protocol Security).
28.08	Vulnerabilities.
29.0	Understand the application of the following concepts of physical security. – The student will be able to:
29.01	Access Control (e.g., physical barriers, biometrics).
29.02	Social Engineering.
29.03	Environment (e.g., wireless cells, location, shielding, fire suppression).
30.0	Understand security concerns and concepts of the following types of devices. – The student will be able to:
30.01	Firewalls.
30.02	Routers.
30.03	Switches.
30.04	Wireless.
30.05	Modems.
30.06	RAS (Remote Access Server).
30.07	Telecom/PBX (Private Branch Exchange).
30.08	VPN (Virtual Private Network).
30.09	IDS (Intrusion Detection System).
30.10	Network Monitoring/Diagnostics.

	30.11 Workstations.
	30.12 Servers.
	30.13 Mobile Devices.
31.0	Recognize and be able to differentiate and explain the following access control models. – The student will be able to:
	31.01 MAC (Mandatory Access Control).
	31.02 DAC (Discretionary Access Control).
	31.03 RBAC (Role Based Access Control).
32.0	Understand the security concerns for the following types of media. – The student will be able to:
	32.01 Coaxial Cable.
	32.02 UTP/STP (Unshielded Twisted Pair / Shielded Twisted Pair).
	32.03 Fiber Optic Cable.
	32.04 Removable Media.
	32.05 Tape.
	32.06 CD-R (Recordable Compact Disks).
	32.07 Hard Drives.
	32.08 Diskettes.
	32.09 Flashcards.
	32.10 Smartcards.
33.0	Explain the following security topologies as they relate to cybersecurity. – The student will be able to:
	33.01 Security Zones.
	33.02 DMZ (Demilitarized Zone).
	33.03 Intranet.
	33.04 Extranet.
	33.05 VLANs (Virtual Local Area Network).

	33.06 NAT (Network Address Translation).
	33.07 Tunneling.
34.0	Demonstrate an understanding of the technical underpinnings of cybersecurity and its taxonomy, terminology, and challenges. – The student will be able to:
	34.01 Explain the various elements that make up the security taxonomy used by the U.S. Computer Emergency Readiness Team (CERT).
	34.02 Describe the challenges associated with achieving and maintaining computer security.
	34.03 Discuss the range of potential consequences of various forms of security breaches.
	34.04 Describe various defense mechanisms, techniques, and methodologies.
	34.05 Compare and contrast mechanisms employed in passive and active cyber attacks.
	34.06 Describe the difference between an inside and an outside attack.
	34.07 Describe vulnerabilities associated with each element of the CIA Triad.
	34.08 Explain the differences between hardware, software, data, and network assets susceptible to cyber attack.
	34.09 Describe the tools and technologies used in cybersecurity.
	34.10 Define intrusion detection and discuss its role in cybersecurity.
	34.11 Explain what is meant by the term countermeasures.
	34.12 Describe the role recovery plays in cybersecurity.
35.0	Demonstrate an understanding of common information and computer system security vulnerabilities. – The student will be able to:
	35.01 Describe the basic categories of vulnerabilities associated with cybersecurity (i.e., hardware, software, network, human, physical, organizational).
	35.02 Describe the ways in which social networks such as Facebook and MySpace are cybersecurity targets.
	35.03 Describe footprinting and explain how it is used to reveal system vulnerabilities.
	35.04 Explain why default values and technical controls are points of vulnerability and describe the hardening efforts being taken by government and industry.
	35.05 Describe the process of port scanning and explain why it is so prevalent in cybersecurity.
	35.06 Describe what is meant by password strength and explain its relationship to vulnerability.
	35.07 Distinguish between a weak and a strong password.

	35.08 Describe some of the ways in which intruders are able to cover their tracks.
	35.09 Describe the circumstances under which a computer system is vulnerable to a denial of service attack.
36.0	Demonstrate an understanding of common cyber attack mechanisms, their consequences, and motivation for their use. – The student will be able to:
	36.01 Describe spoofing as an attack mechanism and discuss its consequences and common motivating factors for its use.
	36.02 Describe the introduction of malware or spyware as an attack mechanism and discuss its consequences and common motivating factors for its use.
	36.03 Describe the use of grayware as an attack mechanism and discuss its consequences and common motivating factors for its use.
	36.04 Describe the use of computer viruses or worms as an attack mechanism and discuss its consequences and common motivating factors for its use.
	36.05 Describe Logic Bombs as an attack mechanism and discuss its consequences and common motivating factors for its use.
	36.06 Describe botnet and rootkit as an attack mechanism and discuss its consequences and common motivating factors for its use.
	36.07 Describe the introduction of a Trojan Horse as an attack mechanism and discuss its consequences and common motivating factors for its use.
	36.08 Describe DNS poisoning as an attack mechanism and discuss its consequences and common motivating factors for its use.
	36.09 Describe buffer overflow as an attack mechanism and discuss its consequences and common motivating factors for its use.
37.0	Be able to identify and explain the following different kinds of cryptographic algorithms. – The student will be able to:
	37.01 Hashing Functions.
	37.02 Symmetric Keys.
	37.03 Asymmetric Keys.
	37.04 Kerberos.
38.0	Demonstrate an understanding of the following kinds of steganographic techniques and their use in cybersecurity. – The student will be able to:
	38.01 Network steganographic methods (e.g., VOIP, WLAN).
	38.02 Digital steganographic methods (e.g., image encryption, audio, mimic functions, video, packet manipulation).
39.0	Understand how cryptography and digital signatures address the following security concepts. – The student will be able to:
	39.01 Confidentiality.
	39.02 Integrity.

	39.03 Authentication.
	39.04 Non-Repudiation.
	39.05 Access Control.
40.0	Understand and be able to explain the following concepts of PKI (Public Key Infrastructure). – The student will be able to:
	40.01 Certificates (e.g., policies, practice statements).
	40.02 Revocation.
	40.03 Trust Models.
41.0	Demonstrate an understanding of certificates and their role in cybersecurity. – The student will be able to:
	41.01 Describe the role of a Certificate Authority (CA).
	41.02 Describe Registration Authority (RA) and its relevance to security certificates.
	41.03 Compare and contrast SSL/TSL X.509-compliant certificates with PGP-compliant certificates.
	41.04 Describe the events that make up the lifecycle of a certificate.
	41.05 Describe how root certificate distribution works.
42.0	Demonstrate an understanding of intrusion, the types of intruders, their techniques, and their motivation. – The student will be able to:
	42.01 Define intrusion.
	42.02 Describe the classes of intruders (i.e., masquerader, misfeasor, clandestine user).
	42.03 Describe what is meant by a hacker and discuss their role in cybersecurity.
	42.04 Compare and contrast the “black hat” and “white hat” hacker cultures (i.e., computer criminal versus computer security expert).
	42.05 Describe various techniques used by hackers to achieve intrusion.
43.0	Demonstrate an understanding of Intrusion Detection Systems (IDS). – The student will be able to:
	43.01 Describe the three logical components that comprise an IDS (i.e., sensors, analyzers, user interface).
	43.02 Explain how user behavior relates to the detection of an intruder.
	43.03 Describe the essential requirements for any IDS.

44.0	Describe host-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature). – The student will be able to:
	44.01 Describe anomaly detection, specifically threshold and profile-based approaches.
	44.02 Describe the types of audit records employed in intrusion detection (i.e., native, detection-specific).
	44.03 Describe signature detection, specifically rule-based anomaly and penetration identification approaches.
45.0	Describe network-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature). – The student will be able to:
	45.01 Describe the primary approach for intrusion detection in a network.
	45.02 Compare and contrast inline and passive sensors.
	45.03 Discuss typical placement of sensors in a network-based IDS environment and explain the rationale for each.
46.0	Demonstrate an understanding of IDS applications. – The student will be able to:
	46.01 Describe the operation, typical activities, and outputs of an intrusion detection system.
	46.02 Describe some of the limitations of intrusion detection systems.
	46.03 Differentiate between an intrusion detection system (passive) and an intrusion prevention (reactive) system.
	46.04 Compare and contrast several of the intrusion detection systems available on the current market.
47.0	Demonstrate an understanding of port scanning and network traffic monitoring employed as intrusion detection techniques. – The student will be able to:
	47.01 Describe the process of monitoring/detecting port scanning attacks and associated patterns.
	47.02 Explain how the monitoring and analysis of network traffic can be used to detect intrusion.
48.0	Demonstrate an understanding of firewalls and other means of intrusion prevention. – The student will be able to:
	48.01 Describe the purpose and limitations of firewalls.
	48.02 Describe the four types of firewalls (i.e., packet filtering, stateful inspection, application-level gateway, circuit-level gateway).
	48.03 Describe the use of honeypots as an intrusion prevention technique.
	48.04 Explain how security policies are used to prevent intruders.
	48.05 Explain how Access Control Lists (ACLs) are used to prevent intrusion.
49.0	Demonstrate an understanding of vulnerabilities unique to virtual computing environments. – The student will be able to:
	49.01 Describe the limitations of traffic monitoring within virtual networks.

	49.02 Discuss the primary vulnerability of virtual operating systems.
	49.03 Describe the “hypervisor” and explain its role in securing a virtual environment.
50.0	Demonstrate an understanding of social engineering and its implications to cybersecurity. – The student will be able to:
	50.01 Define social engineering and describe its role in cybersecurity.
	50.02 Discuss common mechanisms that constitute social engineering (e.g., phishing, baiting, quid pro quo, pretexting).
	50.03 Describe the variety of attacks targeting the human element.
	50.04 Describe countermeasures that can be used to counter social engineering attacks.
51.0	Demonstrate an understanding of fundamental security design principles and their role in limiting points of vulnerability. – The student will be able to:
	51.01 Discuss the three over-arching security design principles (i.e., only necessary, simple, ease of use).
	51.02 Describe the principle of least privilege as it relates to computer security.
	51.03 Describe the principle of separation of duties as it relates to computer security.
	51.04 Describe the principle of defense in depth as it relates to computer security.
	51.05 Describe the principle of fail secure or fail safe as it relates to computer security.
	51.06 Describe the principle of economy of mechanism as it relates to computer security.
	51.07 Describe the principle of complete mediation as it relates to computer security.
	51.08 Describe the principle of open design as it relates to computer security.
	51.09 Describe the principle of least common mechanism as it relates to computer security.
	51.10 Describe the principle of psychological acceptability as it relates to computer security.
	51.11 Describe the principle of leveraging existing components as it relates to computer security.
	51.12 Describe the principle of weakest link as it relates to computer security.
	51.13 Describe the principle of single point of failure as it relates to computer security.
52.0	Demonstrate an understanding of how to configure host systems to guard against cyber intrusion. – The student will be able to:
	52.01 Describe the security features and options available for configuring network routers to prevent intrusion.
	52.02 Describe the various types of firewalls (i.e., packet filtering, stateful, application-level gateway, circuit-level gateway) and how each can be used to prevent intrusion.

52.03	Explain the configuration and operation of a Demilitarized Zone (DMZ) host, including the key services contained within the zone.
52.04	Describe the role of security zones, content filters, subnets, and trusted zones in configuring a network infrastructure.
53.0	Demonstrate an understanding of authentication methods and strategies. – The student will be able to:
53.01	Describe the strengths, vulnerabilities, and countermeasures related to the use of passwords for authentication.
53.02	Describe ways in which passwords are compromised and techniques/models for strengthening.
53.03	Explain token authentication methods (e.g., memory cards, smart cards) and limitations.
54.0	Demonstrate an understanding of methods and strategies for controlling access to computer networks. – The student will be able to:
54.01	Compare and contrast the three primary categories of access control (i.e., discretionary, mandatory, role-based).
54.02	Describe the underlying principles of authorization as an access control mechanism applicable to individuals, system services, subjects, objects.
54.03	Discuss the key features of an access control system (i.e., reliable input, granularity, least privilege, separation of duty, open/close policies, conflict resolution, administration).
54.04	Describe the three elements of access control (i.e., subject, object, right).
54.05	Describe access rights (i.e., read, write, execute, delete, create, search) and their use in establishing individual and group access control policies.
54.06	Compare and contrast the use, operation, and limitations of Access Control Matrix (ACM), Access Control Lists (ACLs), and Capability Tickets in a network environment.
54.07	Describe the UNIX file access control schema.
54.08	Explain the relationship between security policies and access control.
54.09	Describe the use and conceptual operation of formal security policy models (e.g., Bell-La Padula (BLP), Chinese Wall Model (CWM), Harrison Ruzzo Ullman (HRU)).
54.10	Describe the use, strengths, and vulnerabilities of group policies in access control and strategies for ensuring safety.
54.11	Describe the key entities, relationships, and functions that comprise Role-Based Access Control (RBAC), including privilege management considerations.
55.0	Demonstrate an understanding of key network services, their operation, vulnerabilities, and ways in which they may be secured. – The student will be able to:
55.01	Describe the operation of Dynamic Host Configuration Protocol (DHCP), its vulnerabilities, typical cyber attacks, and potential countermeasure strategies.
55.02	Describe the operation of the Domain Name System (DNS) service, its role in a network environment, its vulnerabilities, typical cyber attacks, and potential countermeasure strategies.
55.03	Describe the operation of the Simple Mail Transport Protocol (SMTP), its role in a network environment, its vulnerabilities, typical cyber attacks, and potential countermeasure strategies.
55.04	Describe the operation of the File Transfer Protocol (FTP) and Telnet, their role in a network environment, their vulnerabilities, typical cyber attacks, and potential countermeasure strategies.

56.0	Demonstrate an understanding of the processes involved in hardening a computer system or network. – The student will be able to:
56.01	Describe hardening and some of the general approaches for securing a computer network.
56.02	Describe and apply the process by which a web server is hardened against their typical cyber attacks.
56.03	Describe and apply the process by which a mail server is hardened against their typical cyber attacks.
56.04	Describe and apply the process by which a FTP server is hardened against their typical cyber attacks.
56.05	Describe and apply the process by which a file/print server is hardened against their typical cyber attacks.
56.06	Describe and apply the process by which data repositories are hardened against their typical cyber attacks.
56.07	Describe and apply the process by which Directory Services is hardened against their typical cyber attacks.
56.08	Describe and apply the process by which various network appliances are hardened against their typical cyber attacks.
57.0	Demonstrate an understanding of Public Key Infrastructure (PKI) management functions, key states, and life cycle/transition considerations. – The student will be able to:
57.01	Compare and contrast the forms, limitations, and vulnerabilities associated with centralized and decentralized key management schemas, including the PKI web of trust model.
57.02	Describe key escrow, its role in key management, its advantages, and its risks.
57.03	Differentiate between key backup and key escrow.
57.04	Explain the role of a key's expiration date, its implications on the key's validity, and its relationship to deactivation.
57.05	Describe the circumstances under which a key might be revoked, who has authority to revoke a key, and how revocation is communicated.
57.06	Compare and contrast key suspension and key revocation.
57.07	Describe ways in which key recovery might be achieved, who is authorized to recover keys, and associated vulnerabilities to attack.
57.08	Compare and contrast key renewal and key replacement, who is authorized to initiate renewal or replacement, and associated vulnerabilities to attack.
57.09	Describe the circumstances under which a key might be destroyed, the considerations prior to destruction, and associated vulnerabilities to compromise or attack.
58.0	Demonstrate an understanding of the processes associated with assessing vulnerabilities and risks within an organization. – The student will be able to:
58.01	Describe the process of asset identification relative to risk assessment and the considerations or criteria used in identifying assets requiring protection.
58.02	Describe the process of threat identification, including identifying the types of threats, asset vulnerabilities, and threat sources.
58.03	Describe the process of risk assessment, including determination of attack probability, attack consequences, and assignment of risk priorities.
58.04	Evaluate an existing security posture and identify gaps and vulnerabilities in security.

59.0	Demonstrate an understanding of penetration testing, the types of tests and metrics, testing methodologies, and reporting processes. – The student will be able to:
59.01	Describe the types of penetration tests (i.e., human, physical, wireless, data networks, telecommunications), the goals of each type, the metrics tested, and the value of their results.
59.02	Compare and contrast the processes of black box versus white box penetration testing, including their characteristics, limitations, and appropriateness.
59.03	Define attack vector and explain its relationship and importance to penetration testing.
59.04	Describe common testing methodologies and standards used in penetration testing.
59.05	Describe the salient points, structure, detail, and documentation typically addressed in reporting and debriefing the results of penetration testing.
59.06	Detect malicious and abnormal activities through logs, intrusion detection systems, and other utilities and appliances.
59.07	Reproduce methods that intruders use to gain unauthorized access to a network system for purposes of compromising information assets.
59.08	Deploy proprietary and/or open source tools to test known technical vulnerabilities in networked systems.
59.09	Determine which vulnerabilities are exploitable and estimate the risk and impact of potential exploitations.
59.10	Recommend appropriate mitigation procedures against discovered vulnerabilities and security gaps.
59.11	Model the ethics of a licensed Penetration Tester or Computer Security Specialist.
60.0	Demonstrate an understanding of the Incident Response Life Cycle and the activities comprising each phase. – The student will be able to:
60.01	Describe the activities that make up the Preparation Phase of the Incident Response Life Cycle, including identification of useful tools and resources.
60.02	Describe the activities that make up the Detection and Analysis Phase of the Incident Response Life Cycle, including identification of indication sources, analysis of resulting signs of an intrusion event, documentation and notification of the incident.
60.03	Describe the factors to consider when prioritizing an incident.
60.04	Describe the activities that make up the Containment, Eradication, and Recovery Phase of the Incident Response Life Cycle, including selecting a containment strategy, collecting and preserving evidence for forensic analysis, identifying the attacker, re-securing the system and system restoration.
60.05	Describe the activities that make up the Post Incident Activity Phase of the Incident Response Life Cycle, including identification of lessons learned and evidence retention.

Course Number: CTS0019 **Occupational Completion Point: B** **Information Security Manager – 150 Hours – SOC Code 15-1122**	
61.0	Demonstrate proficiency in cybersecurity risk mitigation planning. – The student will be able to:
61.01	Describe the major activities and security controls that are implemented as part of a sound risk management program.
61.02	Discuss the rationale for executive sponsorship and delineated management responsibilities in successfully implementing a risk management program.
62.0	Demonstrate proficiency in establishing a risk management framework. – The student will be able to:
62.01	Describe the importance of creating a system definition for use in assessing vulnerabilities and risks.
62.02	Describe the major elements of a system definition.
62.03	Differentiate among critical assets, cyber assets, and critical cyber assets.
62.04	Explain why cyber assets are classified as public, restricted, confidential, or private and why this plays a role in creating a risk management framework.
62.05	Compare and contrast the classes of cyber assets (i.e., public, restricted, confidential, private) and give examples of each.
62.06	Create a system definition that identifies all cyber assets, their class, and their risk category (e.g., critical).
62.07	Describe an Electronic Security Perimeter (ESP) and discuss its role in formulating a risk management framework.
62.08	Describe the process and goals of a vulnerability assessment of ESP access points.
62.09	Define risk level and explain the variabilities of its components.
62.10	Describe ways in which system vulnerability may be ranked according to impact (e.g., safety, outage, privacy, monetary).
62.11	Describe some of the security controls (e.g., access control, training, audit, configuration, maintenance) that come into play when determining the appropriate risk mitigation strategy.
62.12	Compare and contrast a top-down and a bottoms-up analysis approach for identifying and mitigating risks.
62.13	Describe the range of testing/evaluation and associated tools used to monitor mitigation control effectiveness.
62.14	Create a risk management framework.
63.0	Demonstrate proficiency in creating a corporate security policy. – The student will be able to:
63.01	Describe the best practices and security controls that typify a sound corporate security policy.
63.02	Discuss the elements of a corporate security policy, including policy management, personnel and training, critical asset management, ESP, physical security, incident reporting and response, disaster recovery and business continuity plans.

	63.03	Describe the need for specific implementation and enforcement processes as part of a corporate security policy.
	63.04	Explain the controls required for addressing personnel risks in a corporate security policy (e.g., training, hiring due diligence, enforcement of “least privilege,” access revocation).
64.0	Demonstrate proficiency in addressing process risks. – The student will be able to:	
	64.01	Describe the best practices and security controls typically implemented for assessing and mitigating operational risks, including:
		64.01.1 Periodic risk assessment.
		64.01.2 Enforce access control, monitoring, and logging.
		64.01.3 Perform disposal/redeployment of assets.
		64.01.4 Enforce change control and configuration management.
		64.01.5 Conduct vulnerability assessments.
		64.01.6 Control, Monitor, and log all access to assets.
		64.01.7 Configuration and maintenance.
		64.01.8 Ensure incident handling processes.
		64.01.9 Provide for contingency planning.
	64.02	Create an organized mitigation table that identifies operational or process risks, the potential impact of the risk, and specific actions required to mitigate the risk.
65.0	Demonstrate proficiency in addressing physical security risks. – The student will be able to:	
	65.01	Describe the best practices and security controls that ensure good physical security of critical infrastructure and assets.
	65.02	Discuss the resulting potential for compromise once physical security is breached.
	65.03	Create an organized mitigation table that identifies physical security risks, the potential impact of the risk, and specific actions required to mitigate the risk.
66.0	Demonstrate proficiency in cybersecurity contingency planning. – The student will be able to:	
	66.01	Define resiliency and its relationship to contingency planning.
	66.02	Describe the purpose and scope of an Information Systems Contingency Plan (ISCP).
	66.03	Identify the five main components of a contingency plan (i.e., Supporting Information, Activation and Notification, Recovery, Reconstitution, and Appendices).
	66.04	Describe the contingency planning process and the rationale for each step in the process.

	66.05	Explain the three step process for conducting a business impact analysis (i.e., determine recovery criticality, identify resource requirements, identify recovery priorities).
	66.06	Compare and contrast Maximum Tolerable Downtime (MTD), Recovery Time Objective (RTO), and Recovery Point Objective (RPO).
	66.07	Discuss the criteria typically used to activate the contingency plan.
	66.08	Discuss the role of backup and recovery considerations in contingency planning.
	66.09	Create a contingency plan that includes roles and responsibilities, a business impact analysis with contingency strategies/solutions, outage assessment, resource recovery priorities, backup and recovery strategies, and testing/training considerations.
67.0	Demonstrate proficiency in cybersecurity disaster recovery planning. – The student will be able to:	
	67.01	Describe the purpose and scope of a cybersecurity disaster recovery plan.
	67.02	Describe various recovery strategies according to their appropriateness.
	67.03	Explain the key considerations when formalizing a disaster recovery plan.
	67.04	Discuss the role of data collection relative to disaster recovery.
	67.05	Identify the types, purposes, and role of documentation during disaster recovery.
	67.06	Discuss the role of testing in a disaster recovery plan.
68.0	Demonstrate proficiency in cybersecurity business continuity planning. – The student will be able to:	
	68.01	Describe the purpose and scope of a cybersecurity business continuity plan.
	68.02	Explain the concept of fault tolerance and discuss its role in business continuity planning.
	68.03	Identify and use various utilities employed for the purpose of business continuity.
	68.04	Describe the role of backups for ensuring business continuity.
69.0	Demonstrate proficiency in the essential elements of forensic analysis. – The student will be able to:	
	69.01	Describe the four phases of forensic analysis and discuss the activities performed in each phase.
	69.02	Describe the forensic and evidentiary considerations when determining containment.
	69.03	Describe the types and sources of data collected for forensic analysis.
	69.04	Explain the various forms of data and associated collection/retrieval tools for the application transport, IP, and link layers.
	69.05	Explain the processes by which data is collected for analysis.

69.06	Describe the role of system event logs in data collection.
69.07	Describe the role of the process log in data collection.
69.08	Describe the processes associated with preserving evidence collected for forensic purposes.
69.09	Describe how the chain of custody can be maintained for evidence collected during a forensic analysis effort.

Course Number: CTS0021 **Occupational Completion Point: B** **Data Security Specialist – 150 Hours – SOC Code 15-1122**	
70.0	Demonstrate an understanding of database design, structure, and operation. – The student will be able to:
70.01	Describe a relational database and its key elements.
70.02	Describe the Entity Relationship Model (ERM) and relate how it is a factor in database security.
70.03	Describe the process of normalization and explain its role in database security.
70.04	Differentiate between one-to-many, many-to-many and one-to-one relationships.
70.05	Define referential integrity and describe its implications on database security.
70.06	Discuss the role of authentication in database security.
71.0	Demonstrate a fundamental understanding of Structured Query Language (SQL). – The student will be able to:
71.01	List the capabilities of SQL SELECT statements.
71.02	Execute basic SQL statements, including SELECT, INSERT, and UPDATE.
71.03	Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.
71.04	Use column aliases to rename columns in the query result.
71.05	Use SQL to display the structure of a table.
71.06	Apply SQL syntax to restrict the rows returned from a query.
71.07	Demonstrate application of the WHERE clause syntax.
71.08	Apply the proper comparison operator to return a desired result.
71.09	Create, drop, rename and truncate tables using SQL.
71.10	Create and remove an index using a SQL statement.
71.11	Create or modify users and roles using SQL statements.
71.12	Use the GRANT and REVOKE SQL statements to control access.
71.13	Differentiate between Data Definition Language (DDL) and Data Manipulation Language (DML) SQL statements and discuss their respective implications to database security.

72.0	Demonstrate an understanding of database security policies. – The student will be able to:
72.01	Explain the role of the Database Management System (DBMS) in maintaining database security.
72.02	Describe three aspects of system level security related to databases (i.e., user privilege schema, user authentication, operating system level privileges).
72.03	Describe the mechanisms that control access to and use of the database at the object level.
72.04	Explain how role-based privilege assignment can be used as a data security model.
72.05	Compare and contrast the implications of connecting to a database with administrator versus user privileges.
73.0	Demonstrate an understanding of database access control, functions, methods, and verification. – The student will be able to:
73.01	Compare and contrast rights and privileges as they relate to database security.
73.02	Describe the manner in which database user rights and privileges are controlled (e.g., granted, revoked).
73.03	Describe application access rights and discuss their role in a database security schema.
73.04	Compare and contrast table, column, and row level security, including VIEW implications.
73.05	Describe fine-grained access control and its use in database security.
73.06	Describe the operation of a database firewall and explain its role in a database security schema.
73.07	Describe how database security policies may be used to trigger security auditing events.
73.08	Describe the various types of auditing (e.g., statement, privilege, object, fine-grained) and associated records.
74.0	Demonstrate an understanding of database vulnerabilities, attack vectors, and associated countermeasures. – The student will be able to:
74.01	Describe the SQL Injection attack vector and explain its potential consequences (e.g., privilege escalation, data compromise, data destruction).
74.02	Describe database inference as a vulnerability and explain how sensitive information can be compromised inadvertently.
74.03	Discuss ways in which to prevent or limit database inference at design time and query time.
74.04	Compare and contrast the various countermeasures and strategies to prevent an SQL injection from being successful.
74.05	Compare and contrast the ways in which encryption might be applied to a database (i.e., database, fields, records, columns) and discuss the tradeoffs of each.
75.0	Demonstrate an understanding of pre- and post-intrusion actions to facilitate database recovery. – The student will be able to:
75.01	Describe the criteria which might be employed to trigger an intrusion or breach alarm.
75.02	Identify the sources for confirming and tracking intrusion.

75.03	Describe the tools and methodologies used to determine the scope of data compromise.
75.04	Assess an intrusion, determine the scope of compromise, and restore compromised data.
75.05	Describe the appropriate actions related to database recovery during incidence response.

Course Number: CTS0060 **Occupational Completion Point: B** **Software Security Specialist – 150 Hours – SOC Code 15-1122**	
76.0	Demonstrate an understanding of software design, structure, and operation. – The student will be able to:
76.01	Describe a typical software application and its key elements.
76.02	Compare and contrast software quality and software security in terms of development time, testing, and implementation.
76.03	Explain how security can be a software design parameter and discuss the inherent trade-offs during the development life cycle.
76.04	Describe the common failings in software security (e.g., input handling, inadequate testing, incomplete/incorrect algorithms, memory misuse, holes for privilege escalation).
77.0	Demonstrate a fundamental understanding of common software attack vectors. – The student will be able to:
77.01	Describe how buffer overflow attacks can be prevented through input validation and proper interpretation.
77.02	Describe a command injection attack, how it can occur, and the potential consequences.
77.03	Describe an SQL injection attack, how it can occur, and the potential consequences.
77.04	Describe a code injection attack, including PHP remote code injection, how it can occur, and the potential consequences.
77.05	Describe cross-site scripting attack, how it can occur, and the potential consequences.
78.0	Demonstrate an understanding input syntax validation. – The student will be able to:
78.01	Explain the need for validating input syntax to ensure proper input handling.
78.02	Describe canonicalization and its role in handling alternate encoding schemas.
78.03	Discuss the risks associated with improper handling of signed or unsigned numeric input (e.g., very large data length versus negative number).
79.0	Demonstrate an understanding of best practices for processing input data to ensure safe and secure program code. – The student will be able to:
79.01	Explain why any input processing algorithm must correctly handle all problem variants.
79.02	Explain why debug or test code should be removed from all production bound software.
79.03	Describe the need for ensuring that machine instructions correctly implement the intended actions of the high-level language code.
79.04	Describe the concept of a strongly typed programming language and explain its role in correct data interpretation.
79.05	Describe memory leak as it pertains to dynamically allocated memory, its causes, and potential consequences (e.g., DOS attack).
79.06	Describe the race condition associated with shared memory access, its causes, and potential consequences (e.g., DOS attack causing deadlock).

80.0	Demonstrate an understanding of the role of environment variables in the operation of software applications. – The student will be able to:
80.01	Describe how the PATH, IFS, and LD_LIBRARY_PATH environment variables can be exploited.
80.02	Explain how dynamic libraries can be subverted through the use of environment variables and describe the potential consequences (e.g., elevated privileges).
80.03	Describe the principle of “least privilege” relative to the operation of software applications, particularly as it relates to file/directory ownership management.
81.0	Demonstrate an understanding of program design strategies for inhibiting elevated privilege attacks. – The student will be able to:
81.01	Describe a Root/Admin program and explain the development and operational benefits of partitioning the program into smaller modules.
81.02	Identify the sources for confirming and tracking intrusion.
81.03	Describe the tools and methodologies used to determine the scope of data compromise.
81.04	Assess an intrusion, determine the scope of compromise, and restore compromised data.
81.05	Describe the appropriate actions related to database recovery during incidence response.

Course Number: CTS0085 **Occupational Completion Point: B** **Web Security Specialist – 150 Hours – SOC Code 15-1122**	
82.0	Demonstrate an understanding of the primary security services used in Internet and intranet environments. – The student will be able to:
82.01	Describe Secure Sockets Layer (SSL) security service.
82.02	Compare and contrast SSL with Transport Layer Security (TLS) as a security service.
82.03	Describe Internet Protocol Security (IPSec) and discuss its benefits and three functional areas (i.e., authentication, confidentiality, key management).
82.04	Describe Secure/Multipurpose Internet Mail Extension (S/MIME) and discuss its role in achieving secure Internet-based communications.
83.0	Demonstrate a fundamental understanding of the SSL protocol stack and its elements. – The student will be able to:
83.01	Compare and contrast SSL Connection and SSL Session.
83.02	Describe SSL Record Protocol services and discuss their role in managing SSL exchanges (i.e., message integrity, confidentiality).
83.03	Describe the operation of the SSL Record Protocol, including the key steps that ensure security (e.g., adding message authentication code, encryption).
83.04	Explain the role of the SSL Change Cipher Spec Protocol in ensuring secure transactions.
83.05	Explain the role of the SSL Alert Protocol.
83.06	Describe the SSL Handshake Protocol and explain the role of each phase of communication (i.e., establish security capability, server authentication/key exchange, client authentication/key exchange, complete secure connection).
84.0	Demonstrate an understanding of IPSec, including its uses, elements, and mechanisms. – The student will be able to:
84.01	Compare and contrast IPSec with SSL and TSL.
84.02	Compare and contrast security services provided under IPv4 and IPv6.
84.03	Differentiate between the three facilities available under IPSec (i.e., Authentication Header, Encapsulating Security Payload, key exchange).
84.04	Describe the concept of Security Association (SA) and explain the roles of its three parameters (i.e., Security Parameters Index, IP Destination Address, Security Protocol Identifier).
84.05	Describe the purpose, structure, and criteria of the Authentication Header (AH).
84.06	Describe the purpose, structure, and elements of the Encapsulating Security Protocol (ESP).
84.07	Describe the structure and operation of the key management facility of IPSec.

85.0	Demonstrate an understanding of S/MIME, including its uses, functions, cryptographic algorithms, and key certificates. – The student will be able to:
85.01	Describe the role of S/MIME in conducting email communications.
85.02	Compare and contrast the four new security functions provided by S/MIME (i.e., enveloped data, signed data, clear-signed data, signed and enveloped data).
85.03	Outline the process of using S/MIME during email processing.
85.04	Describe the various cryptographic algorithms used by S/MIME and discuss their applicability (i.e., DSS, RSA, SHA-1, MD5, ElGamal, AES, 3DES, HMAC).
85.05	Describe memory leak as it pertains to dynamically allocated memory, its causes, and potential consequences (e.g., DOS attack).
85.06	Describe the need for using x.509 v3 public key certificates with S/MIME.
86.0	Demonstrate an understanding of Kerberos and its role in third-part authentication in a distributed network. – The student will be able to:
86.01	Compare and contrast the roles and operation of a Kerberos Authentication Server (AS) and a Ticket Granting Server (TGS).
86.02	Describe a Kerberos realm and the mechanism for inter-realm authentication.
87.0	Demonstrate an understanding of identity management and ways in which secure identify information is exchanged across different domains. – The student will be able to:
87.01	Describe the key components of identity management architecture.
87.02	Describe the concept of identity federation and explain its benefits.
87.03	Describe the standards used in federated identity management (i.e., XML, SOAP, WS-Security, SAML).

Course Number: CTS0089 **Occupational Completion Point: B** **Information Security Administrator – 150 Hours – SOC Code 15-1122**	
88.0	Complete a safety skills inventory. – The student will be able to:
88.01	Practice safety procedures while enrolled in this course.
88.02	Demonstrate an understanding of safety and general policies and procedures.
89.0	Demonstrate acceptable project values. – The student will be able to:
89.01	Maintain a positive relationship with peers.
89.02	Demonstrate adaptive self-management skills.
89.03	Adhere to industry accepted, legal, and ethical standards of cyber conduct.
89.04	Rotate through a wide variety of increasingly responsible experiences.
89.05	Apply basic skills in communications, mathematics, and science appropriate to technological content and learning activities.
90.0	Demonstrate the ability to detect and resolve system vulnerabilities. – The student will be able to:
90.01	Prepare a vulnerability matrix to identify and record weak points, the type of vulnerability, significance of the vulnerability, the priority, and the solution.
90.02	Determine possible solutions for each vulnerability.
90.03	Research each detected vulnerability.
90.04	Document solutions as they are devised.
90.05	Prepare an alternative for any solution that is not successful.
90.06	Continue the process until a workable solution is found for each vulnerability.
91.0	Plan, organize, and carry out a penetration testing plan. – The student will be able to:
91.01	Determine the scope and attack vectors for the test.
91.02	Organize the team according to individual strengths.
91.03	Assign specific tasks within a team.
91.04	Prioritize the attack vectors and sequence the test.
91.05	Identify required resources.

	91.06 Carry out the testing plan to successful completion.
	91.07 Create the test report detailing the goals, tests, findings, and results.
92.0	Demonstrate proficiency in conducting forensic analysis. – The student will be able to:
	92.01 Create security incident handling and response policies.
	92.02 Recover deleted, encrypted, or damaged file information as evidence for prosecution in computer crimes.
	92.03 Deploy proprietary and/or open source tools to identify intruder footprints.
	92.04 Coordinate incident response activities.
	92.05 Prepare proper documentation of chain of custody, including accounting for evidence source, destination, and possession.
	92.06 Preserve forensic integrity of evidence.
	92.07 Model highest moral and ethical standards in conducting digital forensic investigations.
93.0	Successfully work as a member of a team. – The student will be able to:
	93.01 Accept responsibility for specific tasks in a given situation.
	93.02 Document progress, and provide feedback on work accomplished in a timely manner.
	93.03 Complete assigned tasks in a timely and professional manner.
	93.04 Reassign responsibilities when the need arises.
	93.05 Complete daily tasks as assigned on one's own initiative.
94.0	Manage time according to a plan. – The student will be able to:
	94.01 Set realistic time frames and schedules.
	94.02 Record time worked in the daily journal.
	94.03 Meet goals and objectives set by the team.
	94.04 Identify individual priorities.
	94.05 Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities as needed.
95.0	Keep acceptable records of progress problems and solutions. – The student will be able to:
	95.01 Develop a record keeping system in the form of a log book or journal to record daily progress.

	95.02 Use a project journal to identify problem statement.
	95.03 Develop a portfolio of work accomplished to include design drawings, research, drawings and plans, storyboards, models, mock-ups and prototypes.
96.0	Manage resources. – The student will be able to:
	96.01 Identify required resources for each stage of the project plan.
	96.02 Determine the methods needed to acquire needed resources.
	96.03 Demonstrate good judgment in the use of resources.
	96.04 Recycle and reuse resources where appropriate.
	96.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.
97.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:
	97.01 Identify the proper tool for a given job.
	97.02 Use tools and machines in a safe manner.
	97.03 Adhere to laboratory or job site safety rules and procedures.
	97.04 Identify the application of processes appropriate to the task at hand.
	97.05 Identify materials appropriate to their application.
98.0	Research content related to the project and document the results. – The student will be able to:
	98.01 Identify the basic research needed to develop the project plan.
	98.02 Identify available resources for completing background research required in the project plan.
	98.03 Demonstrate the ability to locate resource materials in a library, data base, internet and other research resources.
	98.04 Demonstrate the ability to organize information retrieval.
	98.05 Demonstrate the ability to prepare a topic outline.
	98.06 Write a draft of the design and testing report.
	98.07 Edit and proof the respective report.
	98.08 Prepare an electronically composed report in proper form.
99.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:
	99.01 Prepare a multi-media presentation on the completed project.

	99.02 Make an oral presentation, using multi-media materials.
	99.03 Review the presentation, and make changes in the delivery method(s) to improve presentation skills.
100.0	Demonstrate competency in the area of expertise related to the Applied Cybersecurity education program previously completed that this project is based upon. – The student will be able to:
	100.01 Demonstrate a mastery of the content of the selected subject area.
	100.02 Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.
	100.03 Demonstrate the ability to apply the knowledge, experience and skill developed in the previous program completion to the successful completion of this demonstration.
	100.04 Demonstrate the acquisition of additional knowledge, skill and experience in one area of the selected field of study beyond the performance standards of the initial program standards.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan

with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Cloud Computing & Virtualization**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y100400
CIP Number	0511100303
Grade Level	30, 31
Standard Length	900 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Computer Support Assistant, Network Support Technician, Cloud Specialist, Cloud Virtualization Engineer in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to instruction in computer literacy; software application support; basic hardware configuration and troubleshooting; networking technologies, troubleshooting, security, and administration; and customer service and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of five occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	EEV0504	Computer Support Assistant	150 hours	15-1151
C	CTS0026	Network Support Technician	150 hours	15-1142
D	CTS0054	Cloud Analyst	150 hours	15-1142
E	CTS0056	Cloud Virtualization Specialist	300 hours	15-1142

Note: OTA0040 is a core.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
16.0 Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules.
17.0 Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment.
18.0 Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
19.0 Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems.
20.0 Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems.
21.0 Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked.
22.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, internet, remote access, or direct contact.
23.0 Demonstrate proficiency using graphical user interface (GUI) operating systems.

24.0 Demonstrate language arts knowledge and skills.
25.0 Demonstrate mathematics knowledge and skills.
26.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
27.0 Participate in work-based learning experiences.
28.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
29.0 Perform installation and configuration activities.
30.0 Demonstrate proficiency using computer networks.
31.0 Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers.
32.0 Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability.
33.0 Demonstrate proficiency in managing, configuring and troubleshooting storage use.
34.0 Demonstrate proficiency in configuring and troubleshooting network connections.
35.0 Demonstrate proficiency in implementing, monitoring, and troubleshooting security.
36.0 Evaluate an analyze cloud principles used in cloud computing.
37.0 Identify the components of cloud based services.
38.0 Evaluate cloud based services.
39.0 Use cloud-based services.
40.0 Evaluate and analyze techniques and methods of cloud deployment.
41.0 Evaluate the risks of cloud-based systems.
42.0 Demonstrate an awareness of cloud implementation.
43.0 Demonstrate an understanding of virtualization concepts.
44.0 Install and configure the virtualization server platform.
45.0 Install, configure and manage virtualized clients.
46.0 Demonstrate proficiency in managing a virtualization infrastructure.
47.0 Demonstrate an understanding of storage technologies and storage configuration.
48.0 Demonstrate proficiency in network optimization using network protocols, ports, and topologies.
49.0 Understand security in a virtualized environment.

Florida Department of Education
Student Performance Standards

Program Title: Cloud Computing & Virtualization
PSAV Number: Y100400

Course Number: OTA0040
Occupational Completion Point: A
Information Technology Assistant – 150 Hours – SOC Code 15-1151

Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: EEV0504 Occupational Completion Point – B Computer Support Assistant – 150 Hours – SOC Code 15-1151	
15.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
15.01	Develop strategies for resolving customer conflicts.
16.0	Identify, install, configure, and upgrade desktop and server computer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules. – The student will be able to:
16.01	Identify and describe the functions of main processing boards (e.g., CPUs, RAM, ROM, bus architecture).
16.02	Identify and describe the functions of communication ports (e.g., serial and parallel ports).
16.03	Identify and describe the functions of peripheral devices (e.g., scanners, modems, hard drives, printers).
16.04	Identify and describe the components of portable systems (e.g., battery, LCD, AC adapter, PDAs).
16.05	Troubleshoot, install and upgrade computers and peripherals.
16.06	Perform system hardware setup Demonstrate an understanding of input/output devices.
16.07	Install and configure of applications software, hardware, and device drivers.
16.08	Demonstrate an understanding of the operation and purpose of hardware components.
16.09	Install operating system software.
16.10	Customize operating systems.
16.11	Install application software.
16.12	Perform storage formatting and preparation activities.
16.13	Identify data measurement (e.g., bits, bytes, kilobytes).
16.14	Install and configure RAID.
16.15	Recognize and report on server room environmental issues (temperature, humidity/ESD/power surges, back-up).
17.0	Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment. – The student will be able to:
17.01	Troubleshoot a personal computer system.
17.02	Identify configuration problems.
17.03	Identify software problems.

	17.04 Identify hardware malfunctions.
	17.05 Identify network malfunctions.
	17.06 Resolve computer error messages.
	17.07 Understand and troubleshoot memory and cache systems.
	17.08 Verify that drives are the appropriate type.
	17.09 Describe knowledge database search procedures used to identify possible solutions when troubleshooting software and hardware problems.
18.0	Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace. – The student will be able to:
	18.01 Apply basic rules for hardware safety.
	18.02 Demonstrate proficiency in basic preventative hardware maintenance.
	18.03 Apply special disposal procedures that comply with environmental guidelines for batteries, CRTs, toner kits/cartridges, chemical solvents and cans, and MSDS.
	18.04 Apply ergonomic principles applicable to the configuration of computer workstations.
	18.05 Describe ethical issues and problems associated with computers and information systems.
19.0	Identify specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors and memory in desktop and server computer systems. – The student will be able to:
	19.01 Identify EDO RAM, DRAM, SRAM, RIMM, VRAM, SDRAM, and WRAM.
	19.02 Identify memory banks, memory chips (8-bit, 16-bit, and 32-bit), SIMMS (Single In-line Memory Module), DIMMS (Dual In-line Memory Module), parity chips versus non-parity chips.
	19.03 Identify printer parallel port, COM/serial port, floppy drive, hard drive, Memory, and Boot sequence.
20.0	Demonstrate knowledge of basic types of printers, basic concepts, printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems. – The student will be able to:
	20.01 Identify types of printers—Laser, Inkjet, Dot Matrix.
	20.02 Identify care and service techniques and common problems with primary printer types.
	20.03 Implement and manage printing on a network.
21.0	Identify and describe basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked. – The student will be able to:
	21.01 Define networking and describe the purpose of a network.
	21.02 Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).

	21.03 Describe the various types of network topologies.
	21.04 Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.
	21.05 Configure network and verify network connectivity.
	21.06 Discuss the responsibilities of the network administrator (e.g., rights and responsibilities).
	21.07 Develop user logon procedures.
	21.08 Utilize network management infrastructures (e.g., network monitoring, alerting, security) to perform administrative tasks.
	21.09 Identify common backup strategies and procedures.
	21.10 Select and use appropriate electronic communications software and hardware for specific tasks.
	21.11 Compare and contrast Internet software and protocols.
	21.12 Diagnose and resolve electronic communications operational problems.
	21.13 Design and implement directory tree structures.
	21.14 Install services tools (SNMP, backup software).
	21.15 Perform full backup and verify backup.
	21.16 Identify bottlenecks (e.g., processor, bus transfer, I/O, disk I/O, network I/O, memory).
	21.17 Use the concepts of fault tolerance/fault recovery to create a disaster recovery plan.
	21.18 Document and test disaster recovery plan regularly, and update as needed.
22.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, internet, remote access, or direct contact. – The student will be able to:
	22.01 Apply call center vocabulary.
	22.02 Listen and input information simultaneously.
	22.03 Apply first response assistance for minor repair work.
23.0	Demonstrate proficiency using graphical user interface (GUI) operating systems. – The student will be able to:
	23.01 Identify parts of GUI windows.
	23.02 Create and use icons.
	23.03 Demonstrate proficiency in using menu systems.

	23.04 Demonstrate proficiency in using pointing and selection devices.
	23.05 Identify keyboard shortcuts and special function keys.
	23.06 Demonstrate proficiency in manipulating windows.
	23.07 Utilize help systems and hypertext links.
	23.08 Create, organize, and maintain file system directories.
	23.09 Organize desktop objects.
	23.10 Run multiple applications.
24.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	24.01 Locate, comprehend and evaluate key elements of oral and written information.
	24.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	24.03 Present information formally and informally for specific purposes and audiences.
25.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	25.01 Demonstrate knowledge of arithmetic operations.
	25.02 Analyze and apply data and measurements to solve problems and interpret documents.
	25.03 Construct charts/tables/graphs using functions and data.

Course Number: CTS0026 **Occupational Completion Point – C** **Network Support Technician – 150 Hours – SOC Code 15-1142**	
26.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
	26.01 Develop diplomatic methods to communicate with customers.
27.0	Participate in work-based learning experiences. – The student will be able to:
	27.01 Participate in work-based learning experiences in a network support services environment.
	27.02 Discuss the use of technology in a network environment.
28.0	Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact. – The student will be able to:
	28.01 Apply first response assistance for minor repair work.
29.0	Perform installation and configuration activities. – The student will be able to:
	29.01 Configure the operating system environment.
	29.02 Connect client workstation running similar operating system to the network.
	29.03 Configure Internet access for a network.
	29.04 Configure a Web server.
	29.05 Use remote server to deploy operating system.
	29.06 Troubleshoot failed installations.
	29.07 Install and configure network services for interoperability.
	29.08 Monitor, configure, troubleshoot and control access to printers.
	29.09 Monitor, configure, troubleshoot and control access to files, folders, and shared folders.
	29.10 Monitor, configure, troubleshoot and control access to Web sites.
30.0	Demonstrate proficiency using computer networks. – The student will be able to:
	30.01 Identify and describe the purpose of standards; protocols; and the Open Systems Interconnection (ISO) reference model.
31.0	Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers. – The student will be able to:
	31.01 Configure hardware devices.
	31.02 Configure driver signing options.

	31.03 Update device drivers.
	31.04 Troubleshoot problems with hardware.
32.0	Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability. – The student will be able to:
	32.01 Monitor and optimize usage of system resources.
	32.02 Manage processes.
	32.03 Optimize disk performance.
	32.04 Manage and optimize availability of system data and user data.
	32.05 Recover systems and user data.
33.0	Demonstrate proficiency in managing, configuring and troubleshooting storage use. – The student will be able to:
	33.01 Configure and manage user profiles.
	33.02 Monitor, configure and troubleshoot disks and volumes.
	33.03 Configure data compression.
	33.04 Monitor and configure disk quotas.
	33.05 Recover from disk failures.
34.0	Demonstrate proficiency in configuring and troubleshooting network connections. – The student will be able to:
	34.01 Install, configure and troubleshoot shared access.
	34.02 Install, configure and troubleshoot a virtual private network.
	34.03 Install, configure and troubleshoot network protocols.
	34.04 Install and configure network services.
	34.05 Configure, monitor and troubleshoot remote access.
	34.06 Install, configure, monitor and troubleshoot Terminal Services.
	34.07 Configure the properties of a connection.
	34.08 Install, configure and troubleshoot network adapters and drivers.

35.0	Demonstrate proficiency in implementing, monitoring, and troubleshooting security. – The student will be able to:
	35.01 Encrypt data on a hard disk by using Encrypting File System.
	35.02 Implement, configure, manage and troubleshoot policies in an operating system environment.
	35.03 Implement, configure, manage and troubleshoot auditing.
	35.04 Implement, configure, manage and troubleshoot local accounts.
	35.05 Implement, configure, manage and troubleshoot account policy.
	35.06 Implement, configure, manage and troubleshoot security by using the Security Configuration Tool Set.

Course Number: CTS0054 **Occupational Completion Point – D** **Cloud Analyst – 150 Hours SOC Code 15-1142**
36.0 Evaluate an analyze cloud principles used in cloud computing. – The student will be able to:
36.01 Demonstrate and understanding of the evolution of cloud computing.
36.02 Compare and contrast drivers and limitations of cloud computing.
36.03 Compare and contrast the four main deployment models for cloud computing, public, private, community, and hybrid.
36.04 Describe the three main service models for cloud computing (SaaS,Paas, and Oaas).
36.05 Describe the role of the Internet and virtualization in cloud computing.
36.06 Understand and identify managed services in cloud computing.
37.0 Identify the components of cloud based services. – The student will be able to:
37.01 Demonstrate proficiency in accessing web applications through web browser.
37.02 Describe, identify and use thin clients to complete business tasks.
37.03 Describe, identify and use thick clients to complete business tasks.
37.04 Describe, identify and use mobile clients to complete business tasks.
37.05 Demonstrate an awareness application hosting.
37.06 Demonstrate an awareness of multipurpose architecture.
38.0 Evaluate cloud based services. – The student will be able to:
38.01 Perform calculations to identify the costs and saving of different cloud based models for an organization.
38.02 Compare and contrast cloud based services used in industry.
38.03 Identify the impacts to current and future staffing and operational needs.
38.04 Evaluate performance of cloud-based solutions using performance indicators.
39.0 Use cloud-based services. – The student will be able to:
39.01 Compare and contrast outsourcing and cloud computing as alternatives for business.
39.02 Identify and use cloud based services to improve productivity.

	39.03 Compare and contrast cloud based services for consumer and business.
	39.04 Use cloud based services to perform collaboration online.
	39.05 Demonstrate an awareness of the user experience in using a cloud-based service as compared to traditional business model.
40.0	Evaluate and analyze techniques and methods of cloud deployment. – The student will be able to:
	40.01 Demonstrate an awareness of networking for cloud-based solutions.
	40.02 Demonstrate an awareness of the role of automation and self-service in regard to cloud-based solutions.
	40.03 Demonstrate an awareness of deployment and management of internal and external cloud services to complete business task.
	40.04 Demonstrate an awareness of the role standardization in cloud-based solutions.
	40.05 Demonstrate the impact of time to market, distribution over the Internet in cloud deployment.
41.0	Evaluate the risks of cloud-based systems. – The student will be able to:
	41.01 Identify and evaluate compliance risks relating to software and vendors in cloud-based systems.
	41.02 Demonstrate an understanding of user privacy rights and privacy risks in cloud-based systems.
	41.03 Demonstrate an understanding of legal risks in cloud based systems.
	41.04 Understand the role of vendors and dependencies in cloud-based solutions.
	41.05 Demonstrate an understating of the risks of hardware independence.
	41.06 Identify the main aspects of identity management.
42.0	Demonstrate an awareness of cloud implementation. – The student will be able to:
	42.01 Describe the use of a Virtual Private network access to Local Area Network.
	42.02 Describe the risk of connecting a local cloud network to the public Internet.
	42.03 Identify and describe the components of cloud environment.
	42.04 Demonstrate an understanding of networking topologies in cloud environment.
	42.05 Demonstrate an understanding of serves, switches, and routers in cloud-based architecture.
	42.06 Demonstrate an understanding of the role of the datacenter in cloud-based architecture.

Course Number: CTS0056 **Occupational Completion Point – E** **Cloud Virtualization Specialist – 300 Hours – SOC Code 15-1142**
43.0 Demonstrate an understanding of virtualization concepts. – The student will be able to:
43.01 Demonstrate an understanding of the role of the virtual CPU in virtualization.
43.02 Demonstrate an understanding of the role of virtual memory in virtual component.
43.03 Demonstrate an understanding of system patching for virtual environment.
43.04 Demonstrate an understanding of virtual desktops.
43.05 Evaluate the components of networking topology including (servers, network, storage).
43.06 Compare and contrast traditional desktops and servers to virtual counterpart.
43.07 Demonstrate an understanding of the hardware requirements to create and scale a virtual infrastructure.
43.08 Demonstrate the differences between traditional virtualization and para-virtualization.
43.09 Identify, describe and use guest operating system in a virtualization environment.
43.10 Identify, define and use virtual machine monitor in virtual environment.
43.11 Perform virtual partitioning through the Hypervision.
43.12 Demonstrate an awareness of the bare metal approach for virtualization portioning.
43.13 Demonstrate an awareness of hosted virtualization as a virtualization approach.
43.14 Understand and use industry standards for hardware support for virtualization.
43.15 Demonstrate an understanding of high-level language virtual machines.
43.16 Describe the benefits of server consolidation and containment acquired through migration to virtualization.
43.17 Describe the benefits of test and development optimization gained through virtualization.
43.18 Demonstrate how virtualization reduces cost and complexity of high availability and disaster recovery.
43.19 Demonstrate how virtualization can enhance security in the enterprise.
44.0 Install and configure the virtualization server platform. – The student will be able to:
44.01 Demonstrate an understanding of a virtual image and compare that to a golden image.
44.02 Create a virtual image using a virtualization platform using a base operating system.

44.03	Create a virtual template in which the golden image is configured with the software packages and application.
44.04	Configure the virtual template to ensure software settings and organizational polices are implemented.
44.05	Manage inventory objects licenses using the virtual infrastructure ensure to comply with enterprise requirements.
44.06	Demonstrate how a virtual switch is used to create communication between virtual machines.
44.07	Perform communication between two virtual machines through the use of a virtual switch.
44.08	Create, manage and configure virtual switches to enable communication of virtual machines in different hosts.
44.09	Use virtual system management to remotely manage the allocation in a virtual network.
44.10	Perform and manage user roles and permission in a virtual environment.
44.11	Perform server patching on a virtual environment both on traditional servers as well virtual servers.
44.12	Create a patching baseline.
45.0	Install, configure and manage virtualized clients. – The student will be able to:
45.01	Demonstrate an awareness of peripheral redirection.
45.02	Demonstrate proficiency in configuring virtual client to enable both USB and monitor redirection.
45.03	Compare and contrast the use of peripherals in a traditional and virtual environment.
45.04	Demonstrate an understanding of the types of virtual clients used in a virtualization infrastructure.
45.05	Demonstrate proficiency in performing tasks using thin, thick and mobile virtualization clients.
45.06	Compare and contrast the performance, ease of use and efficiency of different clients in completing business tasks.
45.07	Analyze business tasks that are better aligned to a particular virtualization client type.
45.08	Demonstrate proficiency in managing user sessions and policies of virtual clients.
46.0	Demonstrate proficiency in managing a virtualization infrastructure. – The student will be able to:
46.01	Demonstrate an understanding of the process of cloning virtual machines.
46.02	Identify the benefits of cloning in a virtual infrastructure.
46.03	Compare and contrast full clones and linked clones.
46.04	Demonstrate proficiency in identifying situations in which cloning is a proper solution.

46.05	Demonstrate proficiency in deploying virtual machines using cloning.
46.06	Demonstrate an understating of virtual migration.
46.07	Demonstrate an understanding of the situational needs that require a virtual migration.
46.08	Identify the role of network bandwidth and resource allocation needed for virtual migration.
46.09	Demonstrate an understanding of automating migration to the host server.
46.10	Identify the process that migration affect virtual disk storage in particular SANS.
46.11	Demonstrate proficiency in developing action steps to execute a virtual migration.
47.0	Demonstrate an understanding of storage technologies and storage configuration. – The student will be able to:
47.01	Demonstrate an awareness of the evolution of storage architecture and data center components.
47.02	Describe, identify and use data center elements host, connectivity and storage.
47.03	Identify describe, and use RAID technology in an enterprise environment.
47.04	Identify the impact to application performance based on RAID implementation.
47.05	Demonstrate an awareness of intelligent storage system.
47.06	Compare and contrast storage systems for a virtualization infrastructure.
47.07	Demonstrate an awareness of storage network technologies (Fibre Channel Storage Network FC Scan, IP Scan, Fibre Channel over Ethernet, Network Attached Storage, Object Based, Unified Storage).
47.08	Identify the appropriate storage network solutions based on client requirements.
47.09	Demonstrate proficiency in creating and managing data stores.
47.10	Demonstrate proficiency in configuring and managing resource pools.
48.0	Demonstrate proficiency in network optimization using network protocols, ports, and topologies. – The student will be able to:
48.01	Demonstrate an awareness of disaster recovery (business continuity) information availability for virtualized and non-virtualized environments.
48.02	Demonstrate proficiency in backup and recovery in both virtualized and non-virtualized environments.
48.03	Demonstrate an awareness of deduplication technology for backup optimization.
48.04	Demonstrate an awareness of fixed content storage requirements and archival solutions.
48.05	Demonstrate an awareness of continuous data replication and remote replication in virtualized and non-virtualized environments.

48.06	Demonstrate proficiency in integrating Active Directory to a virtual environment.
48.07	Demonstrate proficiency in CPU and memory optimization.
48.08	Demonstrate proficiency using remote desktops and display protocols to optimize network infrastructure.
48.09	Demonstrate an awareness of fault tolerance and acceptable levels tolerated based on the infrastructure.
49.0	Understand security in a virtualized environment. – The student will be able to:
49.01	Compare and contrast hosted and Bare-Metal virtualization implementations vulnerability to threats and attacks.
49.02	Demonstrate an awareness of data leakage and malicious code intrusion.
49.03	Demonstrate proficiency in securing data between guest and host environments.
49.04	Demonstrate proficiency in managing resource allocation in a virtualized environment to reduce system crash.
49.05	Demonstrate proficiency in creating images that are secure for client deployment.
49.06	Demonstrate an awareness of software security levels and digital signatures.
49.07	Demonstrate proficiency in using, configuring and managing host firewall in a virtualized infrastructure.
49.08	Demonstrate proficiency in using command line to configure and manage the host firewall.
49.09	Demonstrate proficiency in using logging tools to monitor activity in the virtual environment.
49.10	Identify, describe and provide solutions to threats based on scalability and high availability.
49.11	Demonstrate proficiency in securing mobile, thin and thick clients.
49.12	Demonstrate an awareness of threats to network authentication in a virtualized environment.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Database and Programming Essentials**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y300100
CIP Number	0511080207
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 COMP PROG 7G
Additional teacher certifications accepted:	Any Academic Field PLUS appropriate industry certification.
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1141 – Database Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 11 Language: 11 Reading: 11

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and entry-level database and internet/web related careers; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, and technical skills related to database and Internet technologies skills using the latest industry tools. This curriculum is project-based and modeled after the Oracle Academy.

Additional Information related to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point. It is recommended that students complete Algebra I and a programming/flow-charting course concurrently or prior to taking this program.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1141
	CTS0046	Database Fundamentals	150 hours	
	CTS0047	Specialized Database Programming	150 hours	
	CTS0067	Specialized Database Applications	150 hours	

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Develop an awareness of the changes taking place in the Information Age and how they fit into an evolving society.
16.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
17.0 Develop the process of creating an entity by identifying relationships.
18.0 Formulate and assemble initial Entity Relationship by expanding on modeling concepts.
19.0 Consider the degree and optionality of relationships of entities.
20.0 Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and Many-to-Many (M:M) relationships for building Entity Relationship Diagrams.
21.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
22.0 Demonstrate proficiency in data storage and dangers in designing the process for storage by adding complexity to an Entity-Relationship Model (ERM).
23.0 Apply the complex ERM information by fine tuning entities and the process for relating them.
24.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
25.0 Demonstrate proficiency in the technique of normalization by labeling and organizing all items in a database in such a way as to prevent any confusion of mistakes.
26.0 Demonstrate proficiency in table normalization by combining the techniques of an Entity Relationship Model or a top-down, business approach to data with Normalization or a bottom-up mathematical approach to data.
27.0 Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database.
28.0 Extend the ERM presentation model by normalizing the data and mapping the management system.

29.0 Apply techniques for building a storage management system by creating a website using templates and wizards.
30.0 Demonstrate storage closet design and functionality by constructing a group business presentation.
31.0 Demonstrate comprehension of database modeling competency through group presentation.
32.0 Demonstrate comprehension that the database management software is a system for organizing the storage unit (or database) according to business needs and rules, through data integrity constraints.
33.0 Demonstrate comprehension of aspects of SQL Language interface by writing basic SQL statements.
34.0 Demonstrate proficiency working with columns, characters, and rows in SQL.
35.0 Demonstrate proficiency in using SQL comparison operators.
36.0 Demonstrate proficiency in using logical comparisons and precedence rules.
37.0 Demonstrate proficiency using SQL single row functions.
38.0 Demonstrate proficiency displaying data from multiple tables.
39.0 Demonstrate proficiency aggregating data using group functions.
40.0 Demonstrate proficiency utilizing subqueries.
41.0 Demonstrate proficiency producing readable output with SQL language interface and reporting tool and manipulating data.
42.0 Demonstrate proficiency creating and managing database objects.
43.0 Demonstrate proficiency altering tables and constraints implementing views.
44.0 Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects.
45.0 Demonstrate ability to control user access and SQL language interface and reporting tool.
46.0 Demonstrate comprehension of bundling features of SQL.
47.0 Demonstrate comprehension working with composite data types by writing executable script files.
48.0 Demonstrate language arts knowledge and skills.
49.0 Demonstrate mathematics knowledge and skills.
50.0 Describe the differences between SQL and PL/SQL
51.0 Create PL/SQL blocks.
52.0 Use variables in PL/SQL.
53.0 Recognize lexical units.
54.0 Recognize data types.
55.0 Use scalar data types.
56.0 Use various types of joins.
57.0 Use SQL group functions and subqueries.
58.0 Write PL/SQL executable statements.
59.0 Use nested blocks and variable scope.
60.0 Use good programming practices.
61.0 Write DML statements to manipulate data.
62.0 Retrieve data using PL/SQL.
63.0 Manipulate data using PL/SQL.
64.0 Use transaction control statements.
65.0 Use IF conditional control statements.
66.0 Use CASE conditional control statements.
67.0 Use basic loop iterative control statements.
68.0 Use WHILE and FOR loop iterative control statements.
69.0 Use nested loop iterative control statements.

70.0 Use explicit cursors.
71.0 Use explicit cursor attributes.
72.0 Use cursor for loops.
73.0 Use cursors with parameters.
74.0 Use cursors for update transactions.
75.0 Use multiple cursors.
76.0 Handle exceptions.
77.0 Trap Oracle server exceptions.
78.0 Trap user-defined exceptions.
79.0 Create procedures.
80.0 Use parameters in procedures.
81.0 Pass parameters.
82.0 Create stored functions.
83.0 Use functions in SQL statements.
84.0 Manage procedures and functions.
85.0 Manage object privileges.
86.0 Use invoker's rights.
87.0 Create packages.
88.0 Manage package constructs.
89.0 Use advanced package concepts.
90.0 Manage persistent state of package variables.
91.0 Use Oracle-supplied packages.
92.0 Understand dynamic SQL.
93.0 Understand triggers.
94.0 Create DML triggers.
95.0 Create DDL and database event triggers.
96.0 Manage triggers.
97.0 Use large object data types.
98.0 Manage BFILES.
99.0 Manage indexes.
100.0 Manage dependencies.
101.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
102.0 Solve problems using critical thinking skills, creativity and innovation.
103.0 Use information technology tools.
104.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
105.0 Describe the importance of professional ethics and legal responsibilities.
106.0 Program a database application.
107.0 Utilize the basic concepts of database design.
108.0 Utilize SQL and union queries.
109.0 Implement program statements using objects.
110.0 Utilize debugging tools and write error handlers.
111.0 Demonstrate file I/O.

112.0 Create forms and identify all the properties of a form.
113.0 Manipulate data using object models.
114.0 Develop custom controls.
115.0 Utilize API functions.
116.0 Demonstrate database replication and implement database replication using programming tools.
117.0 Analyze and implement security options.
118.0 Implement client/server applications.
119.0 Optimize the performance of a database.
120.0 Perform application distribution.
121.0 Test and debug databases.
122.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
123.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
124.0 Explain the importance of employability skill and entrepreneurship skills.

Florida Department of Education
Student Performance Standards

Program Title: Database and Programming Essentials
PSAV Number: Y300100

Course Number: OTA0040 **Occupational Completion Point: A** **Information Technology Assistant – 150 Hours – SOC Code 15-1151**
Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: CTS0046 **Occupational Completion Point: A** **Database Fundamentals – 150 Hours – SOC Code 15-1141**	
15.0	Develop an awareness of the changes taking place in the information age and how they fit into an evolving society. – The student will be able to:
15.01	Cite examples of jobs, salary and opportunities he/she will have as a result of participating in the Academy.
15.02	Describe the role a database plays in a business and predict its evolution.
15.03	Demonstrate the difference between "data" and "information."
15.04	Understand the importance of clear communication when discussing business informational requirements.
15.05	Identify important historical contributions in database development and design.
16.0	Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs. – The student will be able to:
16.01	Identify and analyze the phases of the database development process.
16.02	Explain what conceptual data modeling and database design involve.
16.03	Compare database development Process with that of the application development process.
16.04	Distinguish between a conceptual model and a physical implementation.
17.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:
17.01	Identify and model various types of entities.
17.02	Identify naming and drawing conventions for entities.
17.03	Sequence the steps that are necessary for creation of an entity.
17.04	Analyze and model the relationships between entities.
18.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:
18.01	Analyze and model attributes.
18.02	Identify unique identifiers for each entity.
18.03	Develop an entity relationship diagram tagging attributes with optionality.
19.0	Consider the degree and optionality of relationships of entities. – The student will be able to:
19.01	Create entity relationship models based on information requirements and interviews.
19.02	Differentiate between one-to-many, many-to-many and one-to-one relationships.

	19.03 Identify relationship between two entities by reading a given diagram.
	19.04 Create a relationship between instances of the same entity.
	19.05 Read an entity relationship model in order to validate it.
20.0	Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams. – The student will be able to:
	20.01 Identify the significance of an attribute that has more than one value for each entity instance.
	20.02 Evaluate appropriate methods of storing validation rules for attributes.
	20.03 Recognize unique identifiers inherited from other entities.
	20.04 Sequence the steps involved in resolving a many-to-many relationship.
21.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:
	21.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).
	21.02 Resolve many-to-many relationships with intersection entities.
	21.03 Model advanced data constructs including recursive relationships, subtypes and exclusive relationships.
	21.04 Create exclusive entities and relationships by using subtypes and arcs, respectively.
	21.05 Identify initial layout for presentation and generate a list of action items for members of group.
	21.06 Develop an entity relationship model using subtypes, supertypes and an exclusive arc.
22.0	Demonstrate proficiency in designing and adding complexity to an Entity. – Relationship Model (ERM)–The student will be able to:
	22.01 Revise an entity relationship model according to the diagramming techniques covered in this course.
	22.02 Define and give examples of hierarchical and recursive relationships.
	22.03 Differentiate between transferable and non-transferable relationships.
	22.04 Deliver a professional, formal business style presentation.
	22.05 Evaluate and critique presentation layout, design and performance.
	22.06 Construct a model using both recursion and hierarchies to express the same conceptual meaning.
	22.07 Distinguish between using date as an attribute and DAY as an entity.

23.0	Apply complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:
	23.01 Describe a relational database and how it differs from other database systems.
	23.02 Define primary keys and foreign keys and describe their purpose.
	23.03 Describe what data integrity refers to and list some constraints.
	23.04 Explain how database design fits into the database development process.
	23.05 Translate an entity-relationship model into a relational database design.
	23.06 Document a database design using table instance charts.
24.0	Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved. – The student will be able to:
	24.01 Demonstrate ability to implement six steps for mapping entity relationship models.
	24.02 Document an initial database design on table instance charts.
	24.03 Recognize raw data and evaluate the steps for creating a data group in unnormalized form.
25.0	Demonstrate proficiency in the technique of normalization by labeling and organizing all items in a database in such a way as to prevent any confusion or mistakes. – The student will be able to:
	25.01 Differentiate between unnormalized data and normalized.
	25.02 Move data from an unnormalized form through to a third normal form.
	25.03 Demonstrate ability to test data groups for third normal form compliance.
	25.04 Identify optimized data groups from given groups of normalized data.
26.0	Demonstrate proficiency in table normalization by combining the techniques of an entity relationship model or a top-down, business approach to data with normalization or a bottom-up mathematical approach to data. – The student will be able to:
	26.01 Compare the normalization and entity relationship modeling (ERM) techniques in terms of strengths and weaknesses.
	26.02 Further define normalization and explain its benefits.
	26.03 Place tables in third normal form.
	26.04 Explain how conceptual data modeling rules ensure normalized tables.
	26.05 Specify referential integrity constraints and design indexes.

27.0	Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database. – The student will be able to:
	27.01 Evaluate the transformation of business requirements into an initial layout and design for a database.
	27.02 Construct simple web page design for personal work folder.
	27.03 Evaluate existing web sites and determine quality of design.
28.0	Extend the ERM presentation model by normalizing the data and mapping the management system. – The student will be able to:
	28.01 Formulate a plan of action for the Database Project using skills previously learned in this course.
	28.02 Normalize an ERM to the third normal form (3NF).
	28.03 Create a table in the database using a database authoring tool.
	28.04 Demonstrate ability to edit tables using a database authoring tool.
	28.05 Create forms that will display the table components created with a database authoring tool.
29.0	Apply techniques for building a storage management system by creating a website using templates and wizards. – The student will be able to:
	29.01 Create a web site that displays the database project home.
	29.02 Link a web site to create a web-enabled interface to the industry database.
	29.03 Edit the forms created and specify appropriate field labels for data entry.
30.0	Demonstrate storage closet design and functionality by constructing a group business presentation. – The student will be able to:
	30.01 Evaluate and generate criteria for a formal, business presentation.
	30.02 Construct a persuasive group presentation using the guidelines set forth in class.
31.0	Demonstrate comprehension of database modeling competency through group presentation. – The student will be able to:
	31.01 Deliver a formal business presentation for the class that discusses an entity-relationship model and initial database design.
	31.02 Demonstrate the functionality of the database and the layout/design capabilities of a database authoring tool.
	31.03 Self-assess learning experience through the presentation and demonstration of their final database project.
32.0	Demonstrate comprehension that the database management software is a system for organizing the storage unit (or database) according to business needs and rules, through data integrity constraints. – The student will be able to:
	32.01 Identify the structural elements of a relational database table.
	32.02 List and describe the system development life cycle.

	32.03 Describe the industry implementation of the relational database management system (RDBMS) and object relational database management system (ORDBMS).
	32.04 Explain how SQL and languages that extend SQL are used in the industry product set.
	32.05 Identify the advantages of a database management system.
33.0	Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements. – The student will be able to:
	33.01 List the capabilities of SQL SELECT statements.
	33.02 Execute a basic select statement.
	33.03 Differentiate between SQL statements and language commands that extend SQL.
34.0	Demonstrate proficiency working with columns, characters, and rows in SQL. – The student will be able to:
	34.01 Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.
	34.02 Use column aliases to rename columns in the query result.
	34.03 Eliminate duplicate rows in the query result.
	34.04 Display the structure of a table.
	34.05 Apply SQL syntax to restrict the rows returned from a query.
	34.06 Demonstrate application of the WHERE clause syntax.
	34.07 Construct and produce output using a SQL query containing character strings and date values.
35.0	Demonstrate proficiency in using SQL comparison operators. – The student will be able to:
	35.01 Apply the proper comparison operator to return a desired result.
	35.02 Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result.
	35.03 Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable.
	35.04 Explain the use of comparison conditions and NULL.
36.0	Demonstrate proficiency in using logical comparisons and precedence rules. – The student will be able to:
	36.01 Evaluate logical comparisons to restrict the rows returned based on two or more conditions.
	36.02 Apply the rules of precedence to determine the order in which expressions are evaluated and calculated.
	36.03 Construct a query to order a results set for single or multiple columns.
	36.04 Construct a query to sort a results set in ascending or descending order.

37.0	Demonstrate proficiency using SQL single row functions. – The student will be able to:
	37.01 Perform calculations on data.
	37.02 Modify individual data items.
	37.03 Use character, number and date functions in SELECT statements.
	37.04 Format data and numbers for display purposes.
	37.05 Convert column data types.
38.0	Demonstrate proficiency displaying data from multiple tables. – The student will be able to:
	38.01 Construct select statements to access data from more than one table using quality and non-equality joins.
	38.02 Use outer joins through viewing data that generally does not meet a join condition.
	38.03 Join a table to itself.
39.0	Demonstrate proficiency aggregating data using group functions. – The student will be able to:
	39.01 Identify the available group functions and describe their use.
	39.02 Demonstrate the ability to group data through the use of the GROUP BY clause.
	39.03 Demonstrate the ability to include or exclude grouped rows by using the HAVING clause.
40.0	Demonstrate proficiency utilizing subqueries. – The student will be able to:
	40.01 Write a query with an embedded subquery.
	40.02 Evaluate and perform a multiple-column subquery.
	40.03 Describe and explain the behavior of subqueries when null values are retrieved.
	40.04 Create a subquery in a FROM clause.
41.0	Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language. – The student will be able to:
	41.01 Produce queries that require an input variable.
	41.02 Customize the SQL language interface and reporting environment using SET commands for control.
	41.03 Produce more readable output through the use of the column and break commands.
	41.04 Describe data manipulation language (DML) and describe various DML statements.

	41.05 Utilize data manipulation language (DML) through inserting, updating and deleting rows from a table.
	41.06 Control transactions using COMMIT and ROLLBACK statements.
42.0	Demonstrate proficiency creating and managing database objects. – The student will be able to:
	42.01 Describe the main database objects.
	42.02 Create tables and alter their definitions.
	42.03 Describe the data types that can be used when specifying column definition.
43.0	Demonstrate proficiency altering tables and constraints implementing views. – The student will be able to:
	43.01 Create, drop, rename and truncate tables using SQL.
	43.02 Identify and describe various constraints including not null, unique, primary key, foreign key, and check.
	43.03 Create and maintain constraints including adding, dropping, enabling, disabling, and cascading.
	43.04 Recognize views and explain how they are created, how they retrieve data and how they perform DML operations.
44.0	Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects. – The student will be able to:
	44.01 Create views, retrieve data through a view, alter the definition of a view and drop a view.
	44.02 Categorize information by using Top-N queries to retrieve specified data.
	44.03 Identify the features of a sequence and display sequence values using a data dictionary view.
	44.04 Identify the characteristics of a cached sequence.
	44.05 Modify and remove a sequence using a SQL statement.
	44.06 Identify the features of private and public synonyms.
	44.07 Identify characteristics of an index and describe different types.
	44.08 Create and remove an index using a SQL statement.
45.0	Demonstrate ability to control user access and SQL language interface and reporting tool. – The student will be able to:
	45.01 Identify the features of database security.
	45.02 Create users using SQL statements.
	45.03 Grant and revoke object privileges using a SQL language interface and reporting tool.

46.0	Demonstrate comprehension of bundling features of SQL. – The student will be able to:
	46.01 List and describe the benefits of extensions to SQL.
	46.02 Recognize the basic SQL block and its sections.
	46.03 Declare SQL variables and describe their significance.
	46.04 Execute a SQL block.
47.0	Demonstrate comprehension working with composite data types by writing executable script files. – The student will be able to:
	47.01 Recognize the significance of the executable section and decide when to use it.
	47.02 Write statements in the executable section.
	47.03 Describe the rules of nested blocks.
	47.04 Identify and utilize appropriate coding conventions.
	47.05 Create a script that will insert, update, merge and delete data in a table.
48.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	48.01 Locate, comprehend and evaluate key elements of oral and written information.
	48.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	48.03 Present information formally and informally for specific purposes and audiences.
49.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	49.01 Demonstrate knowledge of arithmetic operations.
	49.02 Analyze and apply data and measurements to solve problems and interpret documents.
	49.03 Construct charts/tables/graphs using functions and data.

Course Number: CTS0047 **Occupational Completion Point: A** **Specialized Database Programming – 150 Hours – SOC Code 15-1141**	
50.0	Describe the differences between SQL and PL/SQL–The student will be able to:
	50.01 Describe PL/SQL.
	50.02 Differentiate between SQL and PL/SQL.
	50.03 Explain the need for and benefits of PL/SQL.
51.0	Create PL/SQL blocks. – The student will be able to:
	51.01 Describe the structure of a PL/SQL block.
	51.02 Identify the different types of PL/SQL blocks.
	51.03 Identify PL/SQL programming environments.
	51.04 Create and execute an anonymous block.
	51.05 Output messages in PL/SQL.
52.0	Use variables in PL/SQL. – The student will be able to:
	52.01 Describe how variables are used in PL/SQL.
	52.02 Identify the syntax for using variables.
	52.03 Declare and initialize variables.
	52.04 Assign new values to variables.
53.0	Recognize lexical units. – The student will be able to:
	53.01 Describe the types of lexical units in PL/SQL.
	53.02 Describe identifiers and identify valid and invalid identifiers.
	53.03 Describe and identify reserved words, delimiters, literals, and comments.
54.0	Recognize data types. – The student will be able to:
	54.01 Describe the data type categories.
	54.02 Give examples of scalar, composite, and large object (LOB) data types.
	54.03 Identify when an object becomes eligible for garbage collection.

55.0	Use scalar data types. – The student will be able to:
	55.01 Declare and use scalar data types.
	55.02 Define guidelines for declaring and initializing variables.
	55.03 Describe the benefits of anchoring data types with the %TYPE attribute.
56.0	Use various types of JOINS. – The student will be able to:
	56.01 Construct and execute SELECT statements using an equijoin.
	56.02 Construct and execute SELECT statements using a non-equijoin.
	56.03 Construct and execute SELECT statements using an outer join.
	56.04 Construct and execute SELECT statements that result in a Cartesian product.
57.0	Use SQL group functions and subqueries. – The student will be able to:
	57.01 Construct and execute an SQL query using group functions to determine a sum total, an average amount, and a maximum value.
	57.02 Construct and execute an SQL query that groups data based on specified criteria.
	57.03 Construct and execute an SQL query that contains a WHERE clause using a single-row subquery.
	57.04 Construct and execute an SQL query that contains a WHERE clause using a multiple-row subquery.
58.0	Write PL/SQL executable statements. – The student will be able to:
	58.01 Construct variable assignment statements.
	58.02 Construct statements using built-in SQL functions.
	58.03 Differentiate between implicit and explicit data type conversions.
	58.04 Describe when implicit data type conversions take place.
	58.05 List the drawbacks of implicit data type conversions.
	58.06 Construct statements using functions to explicitly convert data types.
	58.07 Construct statements using operators.

59.0	Use nested blocks and variable scope. – The student will be able to:
	59.01 Understand the scope and visibility of variables.
	59.02 Write nested blocks and qualify variables with labels.
	59.03 Describe the scope of an exception.
	59.04 Describe the effect of exception propagation in nested blocks.
60.0	Use good programming practices. – The student will be able to:
	60.01 List examples of good programming practices.
	60.02 Insert comments into PL/SQL code.
	60.03 Follow formatting guidelines when writing code.
61.0	Write DML statements to manipulate data. – The student will be able to:
	61.01 Construct and execute a DML statement to insert data into a table.
	61.02 Construct and execute a DML statement to update data in a table.
	61.03 Construct and execute a DML statement to delete data from a table.
	61.04 Construct and execute a DML statement to merge data into a table.
62.0	Retrieve data using PL/SQL. – The student will be able to:
	62.01 Identify SQL statements that can be directly included in an executable block.
	62.02 Construct and execute an INTO clause to hold values returned by a single-row SELECT statement.
	62.03 Construct statements that retrieve data.
63.0	Manipulate data using PL/SQL. – The student will be able to:
	63.01 Construct and execute PL/SQL statements that manipulate data with DML statements.
	63.02 Describe when to use implicit or explicit cursors.
	63.03 Create code to use SQL implicit cursor attributes to evaluate cursor activity.
64.0	Use transaction control statements. – The student will be able to:
	64.01 Define a transaction and give an example.
	64.02 Construct and execute a transaction control statement.

65.0	Use IF conditional control statements. – The student will be able to:
	65.01 Construct and use an IF statement.
	65.02 Construct and use an IF-ELSIF statement.
	65.03 Create PL/SQL to handle null conditions in an IF statement.
66.0	Use CASE conditional control statements. – The student will be able to:
	66.01 Construct and use CASE statements.
	66.02 Construct and use CASE expressions.
	66.03 Include syntax to handle null conditions in a CASE statement.
	66.04 Include syntax to handle Boolean conditions in IF and CASE statements.
67.0	Use basic LOOP iterative control statements. – The student will be able to:
	67.01 Describe the types of LOOP statements and their uses.
	67.02 Create PL/SQL containing a basic loop and an EXIT statement.
	67.03 Create PL/SQL containing a basic loop and an EXIT statement with conditional termination.
68.0	Use WHILE and FOR loop iterative control statements. – The student will be able to:
	68.01 Construct and use the WHILE looping construct.
	68.02 Construct and use the FOR looping construct.
	68.03 Describe when a WHILE loop is used.
	68.04 Describe when a FOR loop is used.
69.0	Use nested loop iterative control statements. – The student will be able to:
	69.01 Construct and execute PL/SQL using nested loops.
	69.02 Evaluate a nested loop construct and identify the exit point.
70.0	Use explicit cursors. – The student will be able to:
	70.01 List the guidelines for declaring and controlling explicit cursors.
	70.02 Create PL/SQL code to open a cursor and fetch a piece of data into a variable.

	70.03 Use a simple loop to fetch multiple rows from a cursor.
	70.04 Create PL/SQL code to close a cursor.
71.0	Use explicit cursor attributes. – The student will be able to:
	71.01 Define a record structure using the %ROWTYPE attribute.
	71.02 Create PL/SQL code to process the row of an active set using record types in cursors.
	71.03 Use cursor attributes to retrieve information about the state of an explicit cursor.
72.0	Use cursor FOR loops. – The student will be able to:
	72.01 List and explain the benefits of using Cursor FOR loops.
	72.02 Create PL/SQL code to declare a cursor and manipulate it in a FOR loop.
	72.03 Create PL/SQL code containing a Cursor FOR loop using a subquery.
73.0	Use cursors with parameters. – The student will be able to:
	73.01 List the benefits of using parameters with cursors.
	73.02 Create PL/SQL code to declare and manipulate a cursor with a parameter.
74.0	Use cursors for update transactions. – The student will be able to:
	74.01 Create PL/SQL code to lock rows before an update using the appropriate clause.
	74.02 Explain the effect of using NOWAIT in an update cursor declaration.
	74.03 Create PL/SQL code to use the current row of the cursor in an UPDATE or DELETE statement.
75.0	Use multiple cursors. – The student will be able to:
	75.01 Explain the need for using multiple cursors to produce multilevel reports.
	75.02 Create PL/SQL code to declare and manipulate multiple cursors within nested loops.
	75.03 Create PL/SQL code to declare and manipulate multiple cursors using parameters.
76.0	Handle exceptions. – The student will be able to:
	76.01 Describe the advantages of including exception handling code.
	76.02 Describe the purpose of an EXCEPTION section in a PL/SQL block.

	76.03 Create PL/SQL code to include an EXCEPTION section.
	76.04 List the guidelines for exception handling.
77.0	Trap Oracle server exceptions. – The student will be able to:
	77.01 Distinguish between errors defined by the Oracle Server and those defined by the programmer.
	77.02 Differentiate between errors that are handled implicitly and explicitly by the Oracle Server.
	77.03 Write PL/SQL code to trap a predefined Oracle Server error.
	77.04 Write PL/SQL code to trap a non-predefined Oracle Server error.
	77.05 Write PL/SQL code to identify an exception by error code and by error message.
78.0	Trap user-defined exceptions. – The student will be able to:
	78.01 Write PL/SQL code to name a user-defined exception.
	78.02 Write PL/SQL code to raise an exception.
	78.03 Write PL/SQL code to handle a raised exception.
	78.04 Write PL/SQL code to use RAISE_APPLICATION_ERROR.
79.0	Create procedures. – The student will be able to:
	79.01 Differentiate between anonymous blocks and subprograms.
	79.02 Identify the benefits of using subprograms.
	79.03 Describe a stored procedure.
	79.04 Create a procedure.
	79.05 Describe how a stored procedure is invoked.
80.0	Use parameters in procedures. – The student will be able to:
	80.01 Describe how parameters contribute to a procedure.
	80.02 Define a parameter.
	80.03 Create a procedure using a parameter.
	80.04 Invoke a procedure that has parameters.
	80.05 Distinguish between formal and actual parameters.

81.0	Pass parameters. – The student will be able to:
	81.01 List the types of parameter modes.
	81.02 Create a procedure that passes parameters.
	81.03 Identify three methods for passing parameters.
	81.04 Describe the DEFAULT option for parameters.
82.0	Create stored functions. – The student will be able to:
	82.01 Describe the difference between a stored procedure and a stored function.
	82.02 Create a PL/SQL block containing a function.
	82.03 Identify ways in which functions may be invoked.
	82.04 Create a PL/SQL block that invokes a function that has parameters.
83.0	Use functions in SQL statements. – The student will be able to:
	83.01 Describe where user-defined functions can be called from within an SQL statement.
	83.02 Describe the restrictions on calling functions from SQL statements.
	83.03 Describe the purpose of the Data Dictionary.
	83.04 Differentiate between the three types of Data Dictionary views.
	83.05 Write SQL SELECT statements to retrieve information from the Data Dictionary.
	83.06 Explain the use of DICTIONARY as a Data Dictionary search engine.
84.0	Manage procedures and functions. – The student will be able to:
	84.01 Describe how exceptions are propagated.
	84.02 Remove a function and a procedure.
	84.03 Use Data Dictionary views to identify and manage stored procedures.
85.0	Manage object privileges. – The student will be able to:
	85.01 List and explain several object privileges.

	85.02 Explain the function of the EXECUTE object privilege.
	85.03 Write SQL statements to grant and revoke object privileges.
86.0	Use invoker's rights. – The student will be able to:
	86.01 Contrast invoker's rights with definer's rights.
	86.02 Create a procedure that uses invoker's rights.
87.0	Create packages. – The student will be able to:
	87.01 Describe a package, its components, and the reasons for use.
	87.02 Create packages containing related variables, cursors, constants, exceptions, procedures, and functions.
	87.03 Create a PL/SQL block that invokes a package construct.
88.0	Manage package constructs. – The student will be able to:
	88.01 Explain the difference between public and private package constructs.
	88.02 Designate a package construct as either public or private.
	88.03 Specify the syntax to drop a package.
	88.04 Identify Data Dictionary views used to manage packages.
	88.05 Identify the guidelines for using packages.
89.0	Use advanced package concepts. – The student will be able to:
	89.01 Write packages that use the overloading feature.
	89.02 Write packages that use forward declarations.
	89.03 Explain the purpose of a package initialization block.
	89.04 Identify restrictions on using packaged functions in SQL statements.
90.0	Manage persistent state of package variables. – The student will be able to:
	90.01 Identify persistent states of package variables.
	90.02 Control the persistent state of a package cursor.

91.0	Use Oracle-supplied packages. – The student will be able to:
	91.01 Describe two common uses for the DBMS_OUTPUT package.
	91.02 Use the syntax to specify messages for the DBMS_OUTPUT package.
	91.03 Describe the purpose for the UTL_FILE package.
	91.04 Identify the exceptions used in conjunction with the UTL_FILE package.
92.0	Understand dynamic SQL. – The student will be able to:
	92.01 Identify the stages through which all SQL statements pass.
	92.02 Describe the reasons for using dynamic SQL to create an SQL statement.
	92.03 List four PL/SQL statements supporting Native Dynamic SQL.
	92.04 Describe the benefits of Execute Immediate over DBMS_SQL for Dynamic SQL.
93.0	Understand triggers. – The student will be able to:
	93.01 Describe database triggers and their uses.
	93.02 Differentiate between a database trigger and an application trigger.
	93.03 List the guidelines for using triggers.
	93.04 Compare and contrast database triggers and stored procedures.
94.0	Create DML triggers. – The student will be able to:
	94.01 Create a DML trigger and identify its components.
	94.02 Create a statement level trigger.
	94.03 Describe the trigger firing sequence options.
	94.04 Create a DML trigger that uses conditional predicates.
	94.05 Create a row level trigger.
	94.06 Create a row level trigger that uses OLD and NEW qualifiers.
	94.07 Create an INSTEAD OF trigger.

95.0	Create DDL and database event triggers. – The student will be able to:
	95.01 Describe the events that cause DDL and database event triggers to fire.
	95.02 Create a trigger for a DDL statement.
	95.03 Create a trigger for a database event.
	95.04 Describe the functionality of the CALL statement.
	95.05 Describe the cause of a mutating table.
96.0	Manage triggers. – The student will be able to:
	96.01 View trigger information in the Data Dictionary.
	96.02 Disable and enable a database trigger.
	96.03 Remove a trigger from the database.
97.0	Use large object data types. – The student will be able to:
	97.01 Compare and contrast LONG and LOB data types.
	97.02 Describe LOB data types and how they are used.
	97.03 Differentiate between internal and external LOBs.
	97.04 Create and maintain LOB data types.
	97.05 Migrate data from LONG to LOB.
98.0	Manage BFILEs. – The student will be able to:
	98.01 Define BFILEs and the BFILE column data type.
	98.02 Create directory objects and view them in the Data Dictionary.
	98.03 Manage and manipulate BFILEs using BFILENAME and DBMS_LOB.
99.0	Manage indexes. – The student will be able to:
	99.01 Create and manipulate user-defined PL/SQL records.
	99.02 Create an INDEX BY table.
	99.03 Create an INDEX BY table of records.
	99.04 Describe the difference between records, tables, and tables of records.

100.0 Manage dependencies. – The student will be able to:
100.01 Describe the implications of procedural dependencies.
100.02 Contrast dependent objects and referenced objects.
100.03 View dependency information in the Data Dictionary.
100.04 Use the UTLDTREE script to create the objects required to display dependencies.
100.05 Use the IDEPTREE and DEPTREE views to display dependencies.
100.06 Describe when automatic recompilation occurs.
100.07 Describe how to minimize dependency failures.
101.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
101.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
101.02 Locate, organize and reference written information from various sources.
101.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
101.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
101.05 Apply active listening skills to obtain and clarify information.
101.06 Develop and interpret tables and charts to support written and oral communications.
101.07 Exhibit public relations skills that aid in achieving customer satisfaction.
102.0 Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
102.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
102.02 Employ critical thinking and interpersonal skills to resolve conflicts.
102.03 Identify and document workplace performance goals and monitor progress toward those goals.
102.04 Conduct technical research to gather information necessary for decision-making.
103.0 Use information technology tools. – The student will be able to:
103.01 Use personal information management (PIM) applications to increase workplace efficiency.
103.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.

	103.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	103.04 Employ collaborative/groupware applications to facilitate group work.
104.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
	104.01 Describe the nature and types of business organizations.
	104.02 Explain the effect of key organizational systems on performance and quality.
	104.03 List and describe quality control systems and/or practices common to the workplace.
	104.04 Explain the impact of the global economy on business organizations.
105.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	105.01 Evaluate and justify decisions based on ethical reasoning.
	105.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	105.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	105.04 Interpret and explain written organizational policies and procedures.

Course Number: CTS0067 **Occupational Completion Point: A** **Specialized Database Applications – 150 Hours – SOC Code 15-1141**
106.0 Program a database application. – The student will be able to:
106.01 Utilize loop statements.
106.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
106.03 Create user-defined functions.
106.04 Utilize common built-in functions.
106.05 Declare variables in modules and procedures.
106.06 Declare arrays, and initialize elements of arrays.
106.07 Declare and use object variables and collections, and use their associated properties and methods.
106.08 Declare symbolic constants, and make them available locally or publicly.
106.09 Respond to events.
107.0 Utilize the basic concepts of database design. – The student will be able to:
107.01 Apply basic concepts of normalization.
107.02 Utilize the cascade update and cascade delete options.
108.0 Utilize SQL and UNION queries. – The student will be able to:
108.01 Utilize SQL to write common queries.
108.02 Refer to objects by using SQL.
108.03 Utilize UNION queries.
109.0 Implement program statements using objects. – The student will be able to:
109.01 Determine when to use data access objects.
109.02 Differentiate between objects and collections.
109.03 Write statements that access and modify database objects.
109.04 Utilize data access objects.

	109.05 Select appropriate methods and property settings for use with specified objects.
110.0	Utilize debugging tools and write error handlers. – The student will be able to:
	110.01 Trap errors.
	110.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.
	110.03 Debug code samples.
	110.04 Utilize the Debugger to monitor variable values.
	110.05 Write an error handler.
111.0	Demonstrate file I/O. – The student will be able to:
	111.01 Read from files.
	111.02 Write to files.
	111.03 Utilize record locking.
112.0	Create forms and identify all the properties of a form. – The student will be able to:
	112.01 Choose form-specific and report-specific properties to set.
	112.02 Choose control properties to set.
	112.03 Assign event-handling procedures to controls in a form.
	112.04 Define and create form and report modules.
	112.05 Identify the scope of a form or report module.
	112.06 Open multiple instances of a form and refer to them.
	112.07 Assign values to form properties.
	112.08 Use form methods.
113.0	Manipulate data using object models. – The student will be able to:
	113.01 Connect to a data source.
	113.02 Open a recordset.
	113.03 Insert, update, delete and find data.

114.0 Develop custom controls. – The student will be able to:
114.01 Set properties for custom controls.
114.02 Customize user interface controls.
115.0 Utilize API functions. – The student will be able to:
115.01 Properly declare functions.
115.02 Use the by value and by reference parameters.
116.0 Demonstrate database replication and implement database replication using programming tools. – The student will be able to:
116.01 Make a database replicable.
116.02 View a synchronization schedule.
116.03 Explain the purpose of the Replication ID.
116.04 Explain how synchronization conflicts are resolved.
116.05 Identify the advantages of using replication of synchronization.
116.06 Identify the changes that the database engine makes when it converts a nonreplicable database into replicable database.
117.0 Analyze and implement security options. – The student will be able to:
117.01 Analyze a scenario, and recommend an appropriate type of security.
117.02 Explain the steps for implementing security.
117.03 Analyze code to ensure that it sets security options.
117.04 Write code to implement security options.
118.0 Implement client/server applications. – The student will be able to:
118.01 Demonstrate SQL pass through queries and application queries.
118.02 Access external data by using ODBC.
118.03 Trap errors that are generated by the server.
118.04 Optimize connections.
118.05 Optimize performance for a given client/server application.

119.0	Optimize the performance of a database. – The student will be able to:
	119.01 Differentiate between single-field and multiple-field indexes.
	119.02 Optimize queries.
	119.03 Restructure queries to allow faster execution.
	119.04 Optimize performance in distributed applications.
	119.05 Optimize performance for client/server applications.
120.0	Perform application distribution. – The student will be able to:
	120.01 Prepare an application for distribution.
	120.02 Analyze various methods to distribute a client/server application.
	120.03 Distribute custom controls with an application.
	120.04 Provide online help.
121.0	Test and debug databases. – The student will be able to:
	121.01 Implement error handling.
	121.02 Test and debug library databases.
122.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	122.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	122.02 Explain emergency procedures to follow in response to workplace accidents.
	122.03 Create a disaster and/or emergency response plan.
123.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	123.01 Employ leadership skills to accomplish organizational goals and objectives.
	123.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	123.03 Conduct and participate in meetings to accomplish work tasks.
	123.04 Employ mentoring skills to inspire and teach others.

124.0 Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
124.01 Identify and demonstrate positive work behaviors needed to be employable.
124.02 Develop personal career plan that includes goals, objectives, and strategies.
124.03 Examine licensing, certification, and industry credentialing requirements.
124.04 Maintain a career portfolio to document knowledge, skills, and experience.
124.05 Evaluate and compare employment opportunities that match career goals.
124.06 Identify and exhibit traits for retaining employment.
124.07 Identify opportunities and research requirements for career advancement.
124.08 Research the benefits of ongoing professional development.
124.09 Examine and describe entrepreneurship opportunities as a career planning option.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 11, Language 11, and Reading 11. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Applied Information Technology**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y300400
CIP Number	0511010302
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to computer application skills including computer hardware, software applications, web applications, computer programming, web page design and advanced web tools, systems support and maintenance, network concepts, relational database concepts, multimedia tools, cybersecurity ; extensive exploration of information technology careers; strategies for success including goal setting, study skills, organizing skills, learning styles, employability skills, and service learning; and core academic skills with a strong emphasis on effective communication skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of eight occupational completion points. To complete this program, students must complete OCP A and OCP B, plus one or more of the subsequent OCPs (C-H).

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	CTS0072	IT & Web Systems	300 hours	15-1151
C	CTS0063	Database Essentials	150 hours	15-1151
D	CTS0030	Programming Fundamentals	150 hours	15-1151
E	CTS0073	Web Development Fundamentals	150 hours	15-1151
F	CTS0075	Multimedia Systems	150 hours	15-1151
G	CTS0025	Computer Networking	150 hours	15-1151
H	CTS0068	Cybersecurity Essentials	150 hours	15-1151

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Demonstrate proficiency on the principles of design.
16.0 Demonstrate proficiency planning an effective website.
17.0 Demonstrate proficiency formulating a website.
18.0 Demonstrate proficiency using web development tools and techniques.
19.0 Demonstrate proficiency using specialized web design software.
20.0 Demonstrate proficiency gathering and preparing web content.
21.0 Demonstrate an awareness of preparing a website for launch.
22.0 Explain motherboard components, types and features.
23.0 Explain the purpose and characteristics of CPUs and their features.
24.0 Perform installation and configuration activities.
25.0 Demonstrate proficiency using computer networks.
26.0 Perform the process for problem diagnostics and problem resolution through wireless, infrared, telephone, e-mail, remote access, or direct contact.
27.0 Demonstrate knowledge of presentation production issues.
28.0 Demonstrate proficiency using computer networks.
29.0 Demonstrate proficiency communicating over the Internet.
30.0 Demonstrate proficiency in troubleshooting, repair and maintenance of computers.
31.0 Demonstrate proficiency in the basic principles of security concepts and technologies.

32.0 Demonstrate proficiency in operational procedures as they relate to computer equipment and components.
33.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
34.0 Solve problems using critical thinking skills, creativity and innovation.
35.0 Use information technology tools.
36.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
37.0 Describe the importance of professional ethics and legal responsibilities.
38.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
39.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
40.0 Develop the process of creating an entity by identifying relationships.
41.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
42.0 Consider the degree and optionality of relationships of entities.
43.0 Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams.
44.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
45.0 Apply the complex ERM information by fine-tuning entities and the process for relating them.
46.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
47.0 Manipulating data.
48.0 Building and modifying tables.
49.0 Performing queries and filtering records.
50.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
51.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
52.0 Explain the importance of employability skill and entrepreneurship skills.
53.0 Demonstrate personal money-management concepts, procedures, and strategies.
54.0 Plan program design.
55.0 Code programs.
56.0 Test programs.
57.0 Perform program maintenance.
58.0 Create and maintain documentation.
59.0 Develop an awareness of software quality assurance.
60.0 Develop an understanding of programming techniques and concepts.
61.0 Design structured programs.
62.0 Demonstrate proficiency in page design applicable to the WWW.
63.0 Demonstrate proficiency in web page design applicable to the WWW.
64.0 Demonstrate proficiency in using a WYSIWG editor, web design, or web animation software for web page design.
65.0 Demonstrate proficiency in using digital photography and digital imaging.
66.0 Design and create webpages suitable for publishing to the Internet.
67.0 Describe how website performance is monitored and analyzed.
68.0 Demonstrate proficiency in hosting a website.
69.0 Demonstrate the ability to attract traffic for a website.
70.0 Demonstrate knowledge of presentation production issues.
71.0 Demonstrate proficiency in using digital photography and digital imaging.

72.0 Demonstrate basic video production.
73.0 Demonstrate set-up and configuration of a computer for video applications.
74.0 Demonstrate the basic operation of a video workstation.
75.0 Demonstrate basic audio production.
76.0 Set-up and configure a computer for audio applications.
77.0 Operate an audio workstation.
78.0 Demonstrate proficiency in using presentation software and equipment.
79.0 Demonstrate understanding of network technologies.
80.0 Understand, install and configure network hardware.
81.0 Understand, install and configure networking devices.
82.0 Understand, install and configure network management software.
83.0 Understand, install and configure networking tools.
84.0 Install, configure, and manage network security hardware and software devices.
85.0 Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends.
86.0 Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk.
87.0 Recognize and be able to differentiate and explain the following access control models.
88.0 Recognize and be able to differentiate and explain the following methods of authentication.
89.0 Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk.
90.0 Recognize and understand the processes and risks associated with the following security concerns and tasks.
91.0 Recognize and understand the administration of the following types of remote access technologies.
92.0 Recognize and understand the administration of the following email security concepts.
93.0 Recognize and understand the administration of the following Internet security concepts.
94.0 Recognize and understand the administration of the following vulnerabilities.
95.0 Recognize and understand the administration of the following directory security concepts.
96.0 Recognize and understand the administration of the following file transfer protocols and concepts.
97.0 Recognize and understand the administration of the following wireless technologies and concepts.
98.0 Compare and contrast the following types of intrusion detection in terms of implementation and configuration.
99.0 Be able to identify and explain the following different kinds of cryptographic algorithms.
100.0 Understand how cryptography and digital signatures address the following security concepts.
101.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure).
102.0 Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles.

Florida Department of Education
Student Performance Standards

Program Title: Applied Information Technology
PSAV Number: Y300400

Course Number: OTA0040 **Occupational Completion Point: A** **Information Technology Assistant – 150 Hours – SOC Code 15-1151**
Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: CTS0072 **Occupational Completion Point: B** **IT & Web Systems – 300 Hours – SOC Code 15-1151**
15.0 Demonstrate proficiency on the principles of design. – The student will be able to
15.01 Identify industry best practices in visual design (e.g., color schemes, fonts, navigation methods, pagination).
15.02 Explain the key concepts of meeting client needs.
15.03 Apply the principles of Human Computer Interface (HCI) to design and develop an effective look and feel for a website.
15.04 Design and create a webpage for optimal display in multiple browsers.
16.0 Demonstrate proficiency planning an effective website. – The student will be able to:
16.01 Compare and contrast site maps and wireframes.
16.02 Develop an effective site map for a website.
16.03 Create page layout wireframes for a website.
17.0 Demonstrate proficiency formulating a website. – The student will be able to:
17.01 Classify web development tasks according to when they are performed during the web development cycle.
17.02 Describe the different types of business requirements that apply to website design.
17.03 Design business requirements to help ensure success for a specific website.
17.04 Demonstrate ability to use effective designer-client communication skills.
18.0 Demonstrate proficiency using web development tools and techniques. – The student will be able to:
18.01 Compare and contrast writing HTML using a text editor versus using a WYSIWYG editor.
18.02 Design and create an effective web page template.
18.03 Create attractive, engaging, and efficient web pages using a WYSIWYG editor.
18.04 Create an appropriate directory structure, naming convention protocol, and file organization for a website.
18.05 Create DHTML and XML documents using editors or converters.
19.0 Demonstrate proficiency using specialized web design software. – The student will be able to:
19.01 Compare and contrast various specialized web design software (e.g., Flash, Photoshop, Dreamweaver).
19.02 Demonstrate proficiency using various specialized web design software (e.g., Flash, Photoshop, Dreamweaver).

20.0	Demonstrate proficiency gathering and preparing web content. – The student will be able to:
	20.01 Characterize effective writing styles and conventions for the web.
	20.02 Create effective written content for the web.
	20.03 Prepare various types of graphical content for use on a webpage.
	20.04 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	20.05 Create and edit images using image or graphic design software.
	20.06 Compare and contrast static versus dynamic web content.
21.0	Demonstrate an awareness of preparing a website for launch. – The student will be able to:
	21.01 Evaluate a website for basic usability and accessibility issues.
	21.02 List the steps that are necessary to determine when a website is ready to launch.
	21.03 Develop a User Testing Plan.
	21.04 Demonstrate the ability to organize and execute a user testing of a website.
	21.05 Demonstrate proficiency in publishing to the Internet.
22.0	Explain motherboard components, types and features. – The student will be able to:
	22.01 Identify different motherboard form factors (ATX/BTX and micro ATX).
	22.02 Identify input/output interfaces (e.g. USB, serial, NIC).
	22.03 Identify the different types of bus slots (e.g. PCI, AGP, PCMCIA).
	22.04 Identify the BIOS/CMOS/Firmware (e.g. POST, CMOS battery).
23.0	Explain the purpose and characteristics of CPUs and their features. – The student will be able to:
	23.01 Identify types of CPUs (e.g. AMD, Intel).
	23.02 Define hyper threading.
	23.03 Explain multi core (e.g. dual, triple, quad).
	23.04 Explain the difference between onboard cache (e.g. L1, L2, L3).
	23.05 Compare and contrast between real and actual speed.
	23.06 Compare and contrast between 32 bit and 64 bit processing.

24.0	Perform installation and configuration activities. – The student will be able to:
24.01	Install and configure software including device drivers.
24.02	Install and configure operating system software.
24.03	Install and configure application software.
24.04	Install and configure peripherals including device drivers (e.g., scanners, cameras, printers).
24.05	Supervise the testing of operating system management systems (e.g., registry, INI files).
24.06	Prepare the hard disk and related issues for operating system installation (e.g., BIOS, disk controllers).
24.07	Format and partition the hard disk.
24.08	Verify the proper operation of the system (e.g., physical inspection, tests, utilities).
24.09	Compare and contrast memory technologies (e.g., RAM, ROM, virtual memory, memory management).
24.10	Demonstrate proficiency using various memory technologies (e.g., RAM, ROM, virtual memory, memory management).
24.11	Demonstrate proper use of user interfaces, command utilities and troubleshooting utilities.
24.12	Explain the basics of boot sequences, methods and startup utilities.
25.0	Demonstrate proficiency using computer networks. – The student will be able to:
25.01	Compare and contrast various implementation models (e.g., TCP/IP protocols, OSI 7, IPX, cross mapping of protocols).
25.02	Describe an Ethernet network and the use of CSMA\CD.
26.0	Perform the process for problem diagnostics and problem resolution through wireless, infrared, telephone, e-mail, remote access, or direct contact. – The student will be able to:
26.01	Identify, troubleshoot and propose solutions for configuration problems.
26.02	Identify, troubleshoot and propose solutions for software problems.
26.03	Identify, troubleshoot and propose solutions for hardware malfunctions.
26.04	Identify, troubleshoot and propose solutions for network malfunctions.
26.05	Plan and implement a system upgrade and downgrade.
26.06	Evaluate data recovery using various techniques (e.g., MBR repair tools, rescue disks, disk image, backup).
26.07	Organize and perform system maintenance activities (e.g., management console, SNMP, system monitors, diagnostics, virus management).
26.08	Demonstrate corporate interaction proficiency (e.g., responsibility, interaction, communication).

27.0	Demonstrate knowledge of presentation production issues. – The student will be able to:
27.01	Demonstrate knowledge of copyright laws including copyright statute, disclaimers, and filing procedure.
27.02	Demonstrate an understanding of graphic and other file formats (e.g., EPS, TIFF, JPEG, ASCII, MPEG, MIDI, AVI, WAV,) and knowledge of image size when scanning and saving files for use in different presentation types (Web, computer, print).
27.03	Identify display device connectors and types (e.g. VGA, HDMi, S-Video).
27.04	Define refresh rate, resolution, multi-monitor and Degauss.
27.05	Demonstrate knowledge of presentation vocabulary/terms.
27.06	Compare and contrast and utilize various audio/video output solutions and devices (e.g., DVD, CD-Rom, web).
27.07	Compare and contrast removable storage (tape drive, thumb drive, flash drive, USB, external CD-RW, external hard drive).
28.0	Demonstrate proficiency using computer networks. – The student will be able to:
28.01	Define networking and describe the purpose of a network.
28.02	Describe the conceptual background of digital networks including terminology and basics.
28.03	Describe various types of networks and the advantages and disadvantages of each (e.g. peer to peer, client/server, mainframe/terminal).
28.04	Describe the use, advantages, and disadvantages of various network media (e.g. thinnet cable, coaxial), twisted pair (cat 5), fiber optics).
28.05	Describe the function of various network devices (e.g. hub, switched hub or switch, router bridge, gateway, access points)
28.06	Describe the difference between the internet and intranet.
28.07	Compare and contrast IP Version 6 and IP Version 4.
28.08	Compare and contrast the different network types (e.g. broadband, wireless, Bluetooth, cellular).
29.0	Demonstrate proficiency communicating over the Internet. – The student will be able to:
29.01	Display understanding of how Internet Service Providers (ISP) operate and what role they play in enabling users to connect to the Internet.
29.02	Explain how the Internet works and how documents are connected and transferred.
29.03	Configure an email client for SMTP and POP3 servers, including port assignment.
29.04	Explain how the primary modes of Internet communication are used.

30.0	Demonstrate proficiency in troubleshooting, repair and maintenance of computers. – The student will be able to:
30.01	Determine the troubleshooting methods and tools for printers.
30.02	Explain and interpret common laptop issues and basic troubleshooting methods.
30.03	Integrate common preventative maintenance techniques.
31.0	Demonstrate proficiency in the basic principles of security concepts and technologies. – The student will be able to:
31.01	Evaluate encryption technologies, software firewall, authentication technologies, and data security.
31.02	Summarize the following security features (e.g. wireless encryption, malicious software protection and BIOS security, password management, biometrics).
32.0	Demonstrate proficiency in operational procedures as they relate to computer equipment and components. – The student will be able to:
32.01	Compare and contrast ESD, EMI, RFI, and electrical safety.
32.02	Demonstrate proficiency in the use of state regulations for hazardous materials (e.g., MSDS).
33.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
33.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
33.02	Locate, organize and reference written information from various sources.
33.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
33.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.
33.05	Apply active listening skills to obtain and clarify information.
33.06	Develop and interpret tables and charts to support written and oral communications.
33.07	Exhibit public relations skills that aid in achieving customer satisfaction.
34.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
34.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.
34.02	Employ critical thinking and interpersonal skills to resolve conflicts.
34.03	Identify and document workplace performance goals and monitor progress toward those goals.
34.04	Conduct technical research to gather information necessary for decision-making.

35.0	Use information technology tools. – The student will be able to:
	35.01 Use personal information management (PIM) applications to increase workplace efficiency.
	35.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email and internet applications.
	35.03 Employ computer operations applications to access, create, manage, integrate and store information.
	35.04 Employ collaborative/groupware applications to facilitate group work.
36.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
	36.01 Describe the nature and types of business organizations.
	36.02 Explain the effect of key organizational systems on performance and quality.
	36.03 List and describe quality control systems and/or practices common to the workplace.
	36.04 Explain the impact of the global economy on business organizations.
37.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	37.01 Evaluate and justify decisions based on ethical reasoning.
	37.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	37.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	37.04 Interpret and explain written organizational policies and procedures.

Course Number: CTS0063 **Occupational Completion Point: C** **Database Essentials – 150 Hours – SOC Code 15-1151**	
38.0	Develop an awareness of the changes taking place in the information age and how they fit into an evolving society. – The student will be able to:
38.01	Describe the role a database plays in a business and predict its evolution.
38.02	Demonstrate the difference between “data” and “information.”
38.03	Understand the importance of clear communication when discussing business informational requirements.
38.04	Experiment with web-based email and explain how these services use a database.
39.0	Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs. – The student will be able to:
39.01	Identify and analyze the phases of the database development process.
39.02	Explain what conceptual data modeling and database design involves.
39.03	Compare database development process with that of the application development process.
39.04	Identify the need for databases and why they are used.
39.05	Explain the various types of databases (i.e., flat file, relational) and the appropriate use of each.
39.06	Demonstrate proficiency in design methodology by completing appropriate tasks during the appropriate time of the developmental life cycle.
39.07	Demonstrate proficiency in design methodology by considering where the database will reside.
40.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:
40.01	Identify and model various types of entities.
40.02	Identify naming and drawing conventions for entities.
40.03	Sequence the steps that are necessary for creation of an entity.
40.04	Analyze and model the relationships between entities.
41.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:
41.01	Analyze and model attributes.
41.02	Identify unique identifiers for each entity.
41.03	Develop an entity relationship diagram tagging attributes with optionality.

42.0	Consider the degree and optionality of relationships of entities. – The student will be able to:
	42.01 Create models and entity relationship information requirements and interviews.
	42.02 Begin to differentiate between one-to-many, many-to-many and one-to-one relationships.
	42.03 Identify relationship between two entities by reading a given diagram.
	42.04 Create a relationship between instances of the same entity.
	42.05 Read an entity relationship model in order to validate it.
43.0	Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams. – The student will be able to:
	43.01 Identify the significance of an attribute that has more than one value for each entity instance.
	43.02 Evaluate appropriate methods of storing validation rules for attributes.
	43.03 Recognize unique identifiers inherited from other entities.
	43.04 Sequence the steps involved in resolving a many-to-many relationship.
44.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:
	44.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).
	44.02 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.
	44.03 Enforce referential integrity.
45.0	Apply the complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:
	45.01 Describe a relational database and how it is different from other database systems.
	45.02 Define primary keys and foreign keys and describe their purpose.
	45.03 Describe what data integrity refers to and list some constraints.
	45.04 Explain how database design fits into the database development process.
	45.05 Translate an entity-relationship model into a relational database design.
46.0	Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved. – The student will be able to:
	46.01 Recognize raw data and evaluate the steps for creating a data group in unnormalized form (UNF).

47.0	Manipulating data. – The student will be able to:
	47.01 Determine appropriate data inputs and outputs for an existing database.
	47.02 Demonstrate proficiency in record management (i.e., entering, editing, finding, selecting, sorting, deleting records).
	47.03 Change the layout of a datasheet.
	47.04 Create forms, reports, mailing labels, and charts using a database.
	47.05 Export data to appropriate software applications.
	47.06 Demonstrate proficiency in coordinating databases with appropriate software applications.
48.0	Building and modifying tables. – The student will be able to:
	48.01 Create a database table.
	48.02 Create table structures and establish table relationships.
	48.03 Determine fields and assign data types in a database table.
	48.04 Demonstrate appropriate manipulation of database tables (i.e., enter data, add, delete records).
	48.05 Modify a database table by adding, deleting and removing fields.
	48.06 Demonstrate proficiency in the appropriate use of database wizards.
49.0	Performing queries and filtering records. – The student will be able to:
	49.01 Design a query and extract specific data from a database table.
	49.02 Create a calculated field.
	49.03 Filter data in records by selection and by form.
	49.04 Modify a saved query.
50.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. – The student will be able to:
	50.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	50.02 Explain emergency procedures to follow in response to workplace accidents.
	50.03 Create a disaster and/or emergency response plan.

51.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
51.01	Employ leadership skills to accomplish organizational goals and objectives.
51.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
51.03	Conduct and participate in meetings to accomplish work tasks.
51.04	Employ mentoring skills to inspire and teach others.
52.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
52.01	Identify and demonstrate positive work behaviors needed to be employable.
52.02	Develop personal career plan that includes goals, objectives and strategies.
52.03	Examine licensing, certification and industry credentialing requirements.
52.04	Maintain a career portfolio to document knowledge, skills and experience.
52.05	Evaluate and compare employment opportunities that match career goals.
52.06	Identify and exhibit traits for retaining employment.
52.07	Identify opportunities and research requirements for career advancement.
52.08	Research the benefits of ongoing professional development.
52.09	Examine and describe entrepreneurship opportunities as a career planning option.
53.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:
53.01	Identify and describe the services and legal responsibilities of financial institutions.
53.02	Describe the effect of money management on personal and career goals.
53.03	Develop a personal budget and financial goals.
53.04	Complete financial instruments for making deposits and withdrawals.
53.05	Maintain financial records.
53.06	Read and reconcile financial statements.
53.07	Research, compare and contrast investment opportunities.

Course Number: CTSS0030 **Occupational Completion Point: D** **Programming Fundamentals – 150 Hours – SOC Code 15-1151**
54.0 Plan program design. – The student will be able to:
54.01 Formulate a plan to determine program specifications individually or in groups.
54.02 Use a graphical representation or pseudocode to represent the structure in a program or subroutine.
54.03 Design programs to solve problems using problem-solving strategies.
54.04 Prepare proper input/output layout specifications.
54.05 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
54.06 Analyze problem statements.
54.07 Determine what kind of information the desired program must process.
54.08 Formulate concise descriptions of a program's task and purpose.
54.09 Formulate concise descriptions of task and purpose of a program's pieces.
54.10 Organize programs according to the problem analysis.
54.11 Recognize changes in the problem statement.
54.12 Suggest changes in the program organization.
55.0 Code programs. – The student will be able to:
55.01 Write programs according to recognized programming standards.
55.02 Write internal documentation statements as needed in the program source code.
55.03 Code programs using logical statements (e.g., If-Then-Else, Do..While).
55.04 Enter and modify source code using a program language editor.
55.05 Code routines within programs that validate input data.
55.06 Code programs using object-oriented languages (techniques).
55.07 Select the essential aspects of a problem statement.
55.08 Provide a solution to a problem.

	55.09 Find solutions to an extended problem statement.
	55.10 Utilize reference manuals and help systems.
	55.11 Use pre-defined functions within programs.
56.0	Test programs. – The student will be able to:
	56.01 Develop a plan for testing programs.
	56.02 Develop data for use in program testing.
	56.03 Perform debugging activities.
	56.04 Distinguish among the different types of program and design errors.
	56.05 Evaluate program test results.
	56.06 Execute programs and subroutines as they relate to the total application.
	56.07 Develop examples that illustrate the core behavior of each program.
	56.08 Develop examples that illustrate the core behavior of each program component.
	56.09 Illustrate the behavior of boundary cases.
	56.10 Demonstrate an understanding that engineering artifacts requires rigorous and systematic testing.
	56.11 Use examples to show that the solution meets pre-determined criteria.
	56.12 Demonstrate understanding that testing can expose problems but not prove the correctness of the design in an absolute sense.
	56.13 Compile (interpret) and run programs.
57.0	Perform program maintenance. – The student will be able to:
	57.01 Analyze output to identify and annotate errors or enhancements.
58.0	Create and maintain documentation. – The student will be able to:
	58.01 Follow established documentation standards.
59.0	Develop an awareness of software quality assurance. – The student will be able to:
	59.01 Identify the legal and social consequences of errors in software.
	59.02 Describe copyright and other laws that relate to software theft and misuse.

	59.03 Describe software security measures to protect computer systems and data from unauthorized use and tampering (e.g., physical security, passwords, virus protection/prevention).
60.0	Develop an understanding of programming techniques and concepts. – The student will be able to:
	60.01 Identify the basic constructs used in structured programming.
61.0	Design structured programs. – The student will be able to:
	61.01 Design programs that model mathematical relationships from application areas (e.g., accounting, economics, multimedia, programming, science, web).
	61.02 Design programs that deal with multi-faceted objects (e.g., personnel records, physical objects, attributes of HTML tags).
	61.03 Design programs that deal with mixed classes of objects (e.g., a class of geometric shapes containing circles, rectangles, triangles, squares, polygons).
	61.04 Design programs that deal with objects of undetermined size (e.g., shopping lists, family trees, file directories on computers, websites).

Course Number: CTS0073 **Occupational Completion Point: E** **Web Development Fundamentals – 150 Hours – SOC Code 15-1151**	
62.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
62.01	Identify and convert graphic formats.
62.02	Demonstrate proficiency in adding Java scripts to web pages.
63.0	Demonstrate proficiency in web page design applicable to the WWW. – The student will be able to:
63.01	Determine the objectives and the audience for Web pages.
63.02	Identify design strategies to reach and keep an audience.
63.03	Use storyboarding to plan a website.
63.04	Create styles and other design elements (e.g. backgrounds, colors, fonts, buttons).
64.0	Demonstrate proficiency in using a WYSIWG editor, web design, or web animation software for web page design. – The student will be able to:
64.01	Apply style sheets for consistent website design.
64.02	Create and edit images and photographs for Web pages using digital imaging software (e.g., ImageReady in Photoshop).
64.03	Insert audio files into a Web page.
64.04	Create, edit and integrate video files into a Web page.
64.05	Create, edit and integrate animation files into a Web page.
64.06	Demonstrate an understanding of photograph compression factors such as transmission speed, color reduction, and browser support.
64.07	Demonstrate knowledge of image formats related to photos and graphics on the Internet (e.g. Graphic formats (TIFF & EPS), Web formats (JPEG, GIF, PNG).
64.08	Save and export a photograph to the Web in the format best for image quality and file size.
64.09	Build, optimize, edit, and test web pages for publication.
64.10	Create a web page that utilizes plug-ins.
64.11	Demonstrate an understanding of network and web implementation issues (e.g., bandwidth, compression, streaming).
64.12	Compare and contrast various methods by which information may be accessed on the Internet/Intranet (e.g., FTP, telnet, browser).
64.13	Demonstrate an understanding of file encryption methods (e.g., secure server, unsecured server).

65.0	Demonstrate proficiency in using digital photography and digital imaging. – The student will be able to:
65.01	Demonstrate knowledge of ethics related to digital imaging, legal and consent issues.
65.02	Apply effective design principles in digital photography compositions.
65.03	Illustrate the essence of an event, quote, or slogan through digital photography/imaging.
65.04	Demonstrate skill in using digital imaging software for image manipulation, color correction and special effects to creatively convey a message or literary interpretation.
65.05	Demonstrate skill in scanning and cropping photographs.
66.0	Design and create webpages suitable for publishing to the Internet. – The student will be able to:
66.01	Explain the need for web-based applications.
66.02	Evaluate a website for basic usability and accessibility issues.
66.03	Display an understanding of the purposes of site maps and wireframes.
66.04	Develop an effective site map for a website.
66.05	Develop effective wireframes for a website.
66.06	Identify industry best practices in visual design.
66.07	Explain the key concepts of meeting client needs.
66.08	Develop an effective look and feel for a website.
66.09	Develop an effective web page template.
66.10	Describe a correct directory structure, naming convention protocol and file organization for a website.
66.11	Characterize effective writing for the web.
66.12	Create effective written content for the web.
66.13	Decide how to best prepare various types of graphical content for use on a web page.
66.14	Develop a User Testing Plan.
66.15	List the steps that are necessary to determine when a website is ready to launch.
66.16	Demonstrate the ability to organize and execute a user testing of a website.

67.0	Describe how website performance is monitored and analyzed. – The student will be able to:
	67.01 Identify issues related to website maintenance.
	67.02 Use webpage validation tools.
	67.03 Describe website performance metrics (e.g., visits, time-on-page, time-on-site) and discuss their design implications.
	67.04 Demonstrate knowledge of accessibility problems and solutions.
	67.05 Examine indexing, page ranking, basic Search Engine Optimization techniques.
	67.06 Explore common website analytic tools.
	67.07 Construct web pages with streaming media content.
68.0	Demonstrate proficiency in hosting a website. – The student will be able to:
	68.01 Apply professional guidelines to choose, search for and register a domain name.
	68.02 Evaluate criteria upon which to select an appropriate web host.
	68.03 Make generalizations about optimal download speed for a particular website.
	68.04 Demonstrate the ability to upload and download files using FTP protocol.
	68.05 Develop a Maintenance Plan for a client.
69.0	Demonstrate the ability to attract traffic for a website. – The student will be able to:
	69.01 Explain and describe the best practices for attracting traffic to websites.
	69.02 Evaluate an effective search engine optimization strategy.
	69.03 Describe tactics for building online credibility.
	69.04 Explain how to use standard techniques to gather and/or track site statistics.

Course Number: CTS0075 **Occupational Completion Point: F** **Multimedia Systems – 150 Hours – SOC Code 15-1151**	
70.0	Demonstrate knowledge of presentation production issues. – The student will be able to:
70.01	Identify characteristics of various types of presentations (e.g., informing, selling, teaching, entertaining).
70.02	Identify presentation materials (e.g., handouts, seminar notebooks, business cards, coupons) and presentation marketing mediums (i.e., print media such as newspaper, magazines; TV; movies; computer presentations; interactive CD ROM; kiosks, Web pages).
70.03	Identify design characteristics (e.g., fonts, size and styles, backgrounds) that are suited for each type of presentation format and material.
70.04	Demonstrate knowledge of copyright laws including copyright statute, disclaimers, and filing procedures.
70.05	Research and identify skills needed for career positions in multimedia.
70.06	Demonstrate an understanding of graphic and other file formats (e.g., EPS, TIFF, JPEG, ASCII, MPEG, MIDI, AVI, WAV) and knowledge of image size when scanning and saving files for use in different presentation types (e.g., Web, computer, print).
70.07	Demonstrate knowledge of presentation vocabulary/terms.
71.0	Demonstrate proficiency in using digital photography and digital imaging. – The student will be able to:
71.01	Demonstrate knowledge of ethics related to digital imaging, legal and consent issues.
71.02	Apply effective design principles in digital photography compositions.
71.03	Illustrate the essence of an event, quote, or slogan through digital photography/imaging.
71.04	Demonstrate skill in using digital imaging software for image manipulation, color correction, and special effects to creatively convey a message or literary interpretation.
71.05	Demonstrate skill in scanning and cropping photographs.
71.06	Incorporate scanned or digitally taken photographs into documents (poster, brochure, card, photo journalism story, report or book covers, letterhead) that have been designed using desktop publishing software or the desktop publishing features of word processing software.
72.0	Demonstrate basic video production. – The student will be able to:
72.01	Use current industry standard production video equipment.
72.02	Operate camera in studio and location (field) production environments.
72.03	Demonstrate understanding of digital video storage concepts and digital storage media.
72.04	Demonstrate knowledge of and the ability to operate digital recording decks, and other digital storage devices.
72.05	Identify and select microphones for production needs.

	72.06 Determine appropriate lighting needs for production settings.
	72.07 Identify location and studio lighting types, method of use and application.
73.0	Demonstrate set-up and configuration of a computer for video applications. – The student will be able to:
	73.01 Install basic peripheral devices related to video programs.
	73.02 Install and configure software related to video programs.
	73.03 Demonstrate basic knowledge of computer system requirements.
	73.04 Demonstrate basic knowledge of installing plug-ins or additional audio source material such as beats and or samples.
	73.05 Understand the signal flow of a digital video workstation.
74.0	Demonstrate the basic operation of a video workstation. – The student will be able to:
	74.01 Demonstrate knowledge of the digital video workstation interface.
	74.02 Demonstrate a working familiarity and understanding of the function and operation of digital video workstations.
	74.03 Describe a full digital media production cycle
	74.04 Demonstrate ability to edit, cut, erase, and insert video utilizing various digital production techniques.
	74.05 Record video directly to the digital video workstation.
	74.06 Demonstrate knowledge of editing video according to message.
	74.07 Demonstrate skill in using video effects and plug-ins.
	74.08 Describe a first complete run-through of the video production process
	74.09 Characterize the qualities of effective communication in a completed video
	74.10 Prepare a video project for final compositing and export.
	74.11 Transfer video files between various video software applications.
	74.12 Export finished video.
	74.13 Identify and describe solutions to the challenges and obstacles that arise in a video production
75.0	Demonstrate basic audio production. – The student will be able to:
	75.01 Describe digital audio storage concepts and digital storage media.
	75.02 Operate digital recording decks and other digital storage devices.

	75.03 Describe the function and operation of digital audio workstations.
	75.04 Edit, cut, erase and insert sound utilizing various digital production techniques.
	75.05 Perform digital noise reduction and noise extraction via spectral display.
76.0	Set-up and configure a computer for audio applications. – The student will be able to:
	76.01 Install basic peripheral devices related to audio programs.
	76.02 Install and configure software related to audio programs.
	76.03 Demonstrate basic knowledge of computer system requirements.
	76.04 Install plug-ins or additional audio source material such as beats and or samples.
	76.05 Diagram the signal flow of a digital audio workstation.
77.0	Operate an audio workstation. – The student will be able to:
	77.01 Demonstrate knowledge of the digital audio workstation interface.
	77.02 Create and arrange a multi-track project.
	77.03 Create interest and effect using editing techniques
	77.04 Design and edit audio using a waveform editor.
	77.05 Record audio directly to the digital audio workstation.
	77.06 Mix audio.
	77.07 Demonstrate skill in using audio effects and plug-ins.
	77.08 Prepare an audio project for finishing and final mix down.
	77.09 Transfer audio files between various audio software applications.
	77.10 Demonstrate the understanding of audio file bit depth, bandwidth and dithering and be able to explain when and where these apply in various applications of digital audio production.
	77.11 Export finished audio.
78.0	Demonstrate proficiency in using presentation software and equipment. – The student will be able to:
	78.01 Using presentation software, create a multimedia presentation that incorporates shot and edited video, animation, music, narration and adheres to good design principles, use of transitions, and effective message conveyance.
	78.02 Demonstrate knowledge of the roles and responsibilities of a multimedia production team (e.g. project manager, creative or design

	director, content experts, writers, graphic designers, animators, sound designers, videographer, interface designers/programmers).
78.03	Collaborate with team members to plan, edit, evaluate, and present a multimedia presentation.

Course Number: CTS0025 **Occupational Completion Point: G** **Computer Networking – 150 Hours – SOC Code 15-1151**	
79.0	Demonstrate understanding of network technologies–The student will be able to:
79.01	Explain the function of common networking protocols such as TCP,FTP, UDP, TCP/IP suite, DHCP, TFTP, DNS, HTTP(S), ARP, SIP (VoIP), RTP (VoIP), SSH, POP3, NTP, IMAP4, TELNET, SMTP, SNMP 2/3, ICMP, IGMP and TLS.
79.02	Identify commonly used TCP and UDP default ports such as the following: TCP ports, FTP – 20, 21, SSH – 22, TELNET – 23, SMTP – 25, DNS – 53, HTTP – 80, POP3 – 110, NTP – 123, IMAP4 – 143, HTTPS – 443, UDP ports TFTP – 69, DNS – 53, BOOTPS/DHCP – 67 and SNMP – 161.
79.03	Identify the following address formats IPv6, IPv4, and MAC Addressing.
79.04	Evaluate the proper use of the following addressing technologies and addressing schemes: Subnetting, Classful vs. classless (e.g. CIDR, Supernetting), NAT, PAT, SNAT, Public vs. private, DHCP (static, dynamic APIPA), Addressing schemes, Unicast and Multicast, Broadcast.
79.05	Identify common IPv4 and IPv6 routing protocols - Link state OSPF, IS-IS, Distance vector, RIP, RIPv2, BGP and Hybrid EIGRP.
79.06	Explain the purpose and properties of routing such as IGP vs. EGP, Static vs. dynamic, Next Hop, Understanding routing tables and how they pertain to path selection, and explain convergence (steady state).
79.07	Compare the characteristics of wireless communication standards such as 802.11 a/b/g/n, speeds, distance, channels, frequency, authentication and encryption such as WPA, WEP, RADIUS and TKIP.
80.0	Understand, install, and configure network hardware. – The student will be able to:
80.01	Categorize standard cable types and their properties such as CAT3, CAT5, CAT5e, CAT6, STP, UTP, Multimode fiber, single-mode fiber, coaxial, serial, plenum vs non-plenum, transmission speeds, distance, duplex, noise immunity (security, EMI), and frequency.
80.02	Identify common connector types such as RJ-11, RJ-45, BNC, SC, ST, LC and RS-232.
80.03	Identify common physical network topologies such as Star, Mesh, Bus, Ring, Point to Point, Point to Multipoint, and Hybrid.
80.04	Differentiate and implement appropriate wiring standards such as 568A, 568 B Straight vs cross over, rollover, and Loopback.
80.05	Categorize Wan technologies types and properties such as Frame Relay, E1/T1, ADSL, SDSL, VDSL, Cable modem, Satellite, E3/T3, Oc-x, Wireless, ATM, SONET, MPLS, ISD Bri, ISDN PRI, POTS, PSTN, Circuit, switch, packet switch, speed, transmission media, and Distance.
80.06	Categorize LAN technology types and properties such as Ethernet, 10BaseT, 100BaseTX, 100BaseFX, 1000BaseT, 1000BaseX, 10GbaseSR, 10GBaseLR, 10GBaseER, 10GBaseSW , 10GBaseLW, 10GBaseEW, 10GBaseT and properties of each such as CSMA/CD, Broadcast, Collision, Bonding, Speed, and Distance.
80.07	Explain common logical network topologies and their characteristics such as peer to peer, client/server, VPN and VLAN.
80.08	Install components of wiring distribution such as Vertical and horizontal cross connects, Patch panels, 66 block, MDFs, IDFs, 25 pair, 100 pair, 110 block, Demarc, Demarc extension, Smart jack, verify wiring installation and Verify wiring termination.

81.0	Understand, install and configure networking devices. – The student will be able to:
81.01	Install, configure and differentiate between common network devices such as hub, repeater, modem, NIC, media converters, basic switch, bridge, wireless access point, basic router, basic firewall and basic DHCP server.
81.02	Identify the function of specialized network devices such as multilayer switch, Content switch, IDS/IPS, load balancer, multifunction network devices, DNS server Bandwidth shaper, proxy server, and CSU/DSU.
81.03	Explain the advance features of a switch such as PoE, Spanning tree, VLAN, Trunking, Port mirroring, and Port Authentication.
81.04	Implement a basic wireless network using the following technologies installed client, access point placement, access point with encryption, access point with configured channels and frequencies, and a set ESSSID and beacon.
82.0	Understand, install and configure network management software. – The student will be able to:
82.01	Explain the function of the OSI layer model such as physical, data link, network, transport, session, presentation and application.
82.02	Identifies types of configuration management documentation such as wiring schematics, physical and logical network diagram, baselines, policies, procedure and configuration and regulations.
82.03	Evaluate the network based on configuration management documentation such as compare wiring schematics, physical and logical network diagrams, baselines, policies and procedures, and configurations to network devices and infrastructure, and update wiring schematics, physical and logical network diagrams, configuration and job logs as needed.
82.04	Conduct network monitoring to identify performance and connectivity issues using the following: network monitoring utilities (packet sniffers, connectivity software, load testing, throughput testers) and system logs, history and event log.
82.05	Conduct network monitoring to identify performance and connectivity issues using the following: network monitoring utilities (packet sniffers, connectivity software, load testing, and throughput testers), system logs, history logs, and event logs.
82.06	Explain different methods and rationales for network performance optimization such as QoS, Traffic shaping, Load balancing, high availability, Caching engines, Fault tolerance, Latency sensitivity, High bandwidth applications, VoIP, Video applications, and Uptime.
82.07	Implement the following network troubleshooting methodology - Information gathering, identify symptoms and problems, Identify the affected areas of the network, Determine if anything has changed, Establish the most probable cause, Determine if escalation is necessary, Create an action plan and solution identifying potential effects, Implement and test the solution, Identify the results and effects of the solution, and Document the solution and the entire process.
82.08	Troubleshoot common connectivity issues and select an appropriate solution Physical issues: Cross talk, Near End crosstalk, Attenuation, collisions, Shorts Open, Impedance mismatch (echo), and Interference - Logical issues: Port speed, Port duplex mismatch, incorrect VLAN, Incorrect IP address, Wrong gateway, Wrong DNS, Wrong subnet mask, Issues that should be identified but escalated: Switching loop, Routing loop, Route problems, Proxy arp, Broadcast storms, Wireless Issues: Interference (bleed, environmental factors), incorrect encryption, Incorrect channel, Incorrect frequency, ESSID mismatch, Standard mismatch (802.11 a/b/g/n), Distance, Bounce, and Incorrect antenna placement.
83.0	Understand, install and configure networking tools. – The student will be able to:
83.01	Select the appropriate command line interface tool and interpret the output to verify functionality such as Traceroute, Ipconfig, IFconfig, Ping, Arp ping, Arp, Nslookup, Hostname, Dig, Mtr, Route, and Nbtstat.
83.02	Explain the purpose of network scanners such as Packet sniffers, Intrusion detection software, Intrusion prevention softwareand Port scanners.

	83.03	Utilize the appropriate hardware tools such as Cable testers, Protocol analyzer, Certifiers, TDR, OTDR, Multimeter, Toner probe, Butt set, Punch down tool, Cable stripper, Snips, Voltage event recorder, and Temperature monitor.
84.0	Install, configure, and manage network security hardware and software devices. – The student will be able to:	
	84.01	Explain the function of hardware and software security devices such as Network based firewall, Host based firewall, IDS, IPS, and VPN concentrator.
	84.02	Explain common features of a firewall for example: Application layer vs. network layer, Stateful vs. stateless, Scanning services, Content filtering, Signature identification, and Zones.
	84.03	Explain the methods of network access security using the following: Filtering: ACL, MAC filtering, IP filtering, Tunneling and encryption, SSL VPN, VPN, L2TP, PPTP, IPSEC, Remote access, RAS, RDP, PPPoE, PPP, VNC, and ICA.
	84.04	Explain methods of user authentication using the following methods: PKI, Kerberos, AAA, RADIUS, TACACS+, Network access control, 802.1x, CHAP, MS-CHAP, and EAP.
	84.05	Explain issues that affect device security such as the Physical security, Restricting local and remote access, Secure methods vs. unsecure methods, SSH, HTTPS, SNMPv3, SFTP, SCP, and TELNET, HTTP, FTP, RSH, RCP and SNMPv1/2.
	84.06	Identify common security threats and mitigation techniques such as Security threats, DoS, Viruses, Worms, Attackers, Man in the middle, murf, Rogue access points, Social engineering (phishing), Mitigation techniques, Policies and procedures, User training, Patches and updates.

Course Number: CTS0068 **Occupational Completion Point: H** **Cybersecurity Essentials – 150 Hours – SOC Code 15-1151**	
85.0	Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends. – The student will be able to:
	85.01 Describe the history of cybersecurity, including the evolution of a hacker culture.
	85.02 Discuss the trends and national initiatives related to cybersecurity.
	85.03 Distinguish between information assurance and cybersecurity.
	85.04 Describe the concepts of confidentiality as it relates to user and data impact.
	85.05 Explain authentication and the concept of non-repudiation.
	85.06 Describe the concept of “Hacking - The Human Element” and elaborate on its implications to cybersecurity.
86.0	Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:
	86.01 Viruses.
	86.02 Trojan Horses.
	86.03 Logic Bombs.
	86.04 Worms.
87.0	Recognize and be able to differentiate and explain the following access control models. – The student will be able to:
	87.01 MAC (Mandatory Access Control).
	87.02 DAC (Discretionary Access Control).
	87.03 RBAC (Role Based Access Control).
88.0	Recognize and be able to differentiate and explain the following methods of authentication. – The student will be able to:
	88.01 Kerberos.
	88.02 CHAP (Challenge Handshake Authentication Protocol).
	88.03 Certificates.
	88.04 Username/Password.
	88.05 Tokens.

	88.06 Multi-factor.
	88.07 Mutual.
	88.08 Biometrics.
89.0	Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:
	89.01 DOS/DDOS (Denial of Service/Distributed Denial of Service).
	89.02 Back Door.
	89.03 Spoofing.
	89.04 Man in the Middle.
	89.05 Replay.
	89.06 TCP/IP Hijacking.
	89.07 Weak Keys.
	89.08 Mathematical.
	89.09 Social Engineering.
	89.10 Birthday.
	89.11 Password Guessing (e.g., Brute Force, Dictionary).
	89.12 Software Exploitation.
90.0	Recognize and understand the processes and risks associated with the following security concerns and tasks. – The student will be able to:
	90.01 Identify non-essential services and protocols and know what actions to take to reduce the risks of those services and protocols.
	90.02 Understand the concept of and know how reduce the risks of social engineering.
	90.03 Understand the concept and significance of auditing, logging and system scanning.
	90.04 Identify and be able to differentiate different cryptographic standards and protocols.
91.0	Recognize and understand the administration of the following types of remote access technologies. – The student will be able to:
	91.01 802.1x.
	91.02 VPN (Virtual Private Network).

	91.03 RADIUS (Remote Authentication Dial-In User Service).
	91.04 TACACS (Terminal Access Controller Access Control System).
	91.05 L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).
	91.06 SSH (Secure Shell).
	91.07 IPSEC (Internet Protocol Security).
	91.08 Vulnerabilities.
92.0	Recognize and understand the administration of the following email security concepts. – The student will be able to:
	92.01 S/MIME (Secure Multipurpose Internet Mail Extensions).
	92.02 PGP (Pretty Good Privacy) like technologies.
	92.03 Vulnerabilities.
	92.04 SPAM.
	92.05 Hoaxes.
93.0	Recognize and understand the administration of the following Internet security concepts. – The student will be able to:
	93.01 SSL/TLS (Secure Sockets Layer Transport Layer Security).
	93.02 HTTP/S (Hypertext Transfer Protocol/Hypertext Transfer Protocol over Secure Sockets Layer).
	93.03 Instant Messaging (i.e., Vulnerabilities, Packet Sniffing, Privacy).
94.0	Recognize and understand the administration of the following vulnerabilities. – The student will be able to:
	94.01 Java Script.
	94.02 ActiveX.
	94.03 Buffer Overflows.
	94.04 Cookies.
	94.05 Signed Applets.
	94.06 CGI (Common Gateway Interface).
	94.07 SMTP (Simple Mail Transfer Protocol) Relay.

95.0	Recognize and understand the administration of the following directory security concepts. – The student will be able to:
	95.01 SSL/TLS (Secure Sockets Layer/Transport Layer Security).
	95.02 LDAP (Lightweight Directory Access Protocol).
96.0	Recognize and understand the administration of the following file transfer protocols and concepts. – The student will be able to:
	96.01 S/FTP (File Transfer Protocol).
	96.02 Blind FTP (File Transfer Protocol)/Anonymous.
	96.03 File Sharing.
	96.04 Vulnerabilities (i.e., packet sniffing, naming conventions).
97.0	Recognize and understand the administration of the following wireless technologies and concepts. – The student will be able to:
	97.01 WTLS (Wireless Transport Layer Security).
	97.02 802.11 and 802.11x.
	97.03 WEP/WAP (Wired Equivalent Privacy/Wireless Application Protocol).
	97.04 Vulnerabilities (i.e., site surveys).
98.0	Compare and contrast the following types of intrusion detection in terms of implementation and configuration. – The student will be able to:
	98.01 Network Based – Active and Passive.
	98.02 Host Based – Active and Passive.
	98.03 Honey Pots.
	98.04 Incident Response.
99.0	Be able to identify and explain the following different kinds of cryptographic algorithms. – The student will be able to:
	99.01 Hashing.
	99.02 Symmetric.
	99.03 Asymmetric.
100.0	Understand how cryptography and digital signatures address the following security concepts. – The student will be able to:
	100.01 Confidentiality.
	100.02 Integrity.

	100.03 Authentication.
	100.04 Non-Repudiation.
	100.05 Access Control.
101.0	Understand and be able to explain the following concepts of PKI (Public Key Infrastructure). – The student will be able to:
	101.01 Certificates (e.g., policies, practice statements).
102.0	Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles. – The student will be able to:
	102.01 Centralized versus Decentralized.
	102.02 Hardware versus software key storage.
	102.03 Private key storage.
	102.04 Escrow.
	102.05 Expiration.
	102.06 Revocation versus suspension (e.g., status checking).
	102.07 Recovery authorization schema (e.g., M-of-N Control - Of M appropriate individuals, N must be present to authorize recovery).
	102.08 Renewal.
	102.09 Destruction.
	102.10 Key Usage.
	102.11 Multiple Key Pairs (Single, Dual).

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Digital Media Technology**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y500100
CIP Number	0509070200
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	BUS ED 1 @2 DIGI MEDIA 7G INFO TECH 7G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1142 – Network and Computer Systems Administrators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in technical digital media positions in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills.

The content includes but is not limited to practical experiences in the implementation, management, and maintenance of advanced telecommunication environments associated with the creation, packaging, and delivery of digital media.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	DIG0080	Digital Media Technician	600 hours	15-1142

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Describe characteristics of digital media relative to format, standards, encoding schemes, and origin.
16.0 Compare and contrast various forms of digital media delivery systems.
17.0 Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital video.
18.0 Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital audio.
19.0 Explain the role of animation in digital media and the ways in which it is created and deployed.
20.0 Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital video.
21.0 Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital audio.
22.0 Apply industry standard workflow management methods applicable to the integration and synchronization of audio and video into a single digital media product.
23.0 Apply industry standard asset management methods applicable to development of a digital media product.
24.0 Explain the importance of calibration in the production of digital media and the means by which it is accomplished.
25.0 Demonstrate proficiency in producing a digital media product for delivery using Digital Video Disc (DVD) media.
26.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based on-demand system (e.g., VOD, IPTV).
27.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based streaming system.
28.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based system featuring multi-point presence.
29.0 Demonstrate proficiency in producing a digital media product for delivery using mobile communication devices.
30.0 Demonstrate proficiency in producing a digital media product for delivery using satellite delivery systems.
31.0 Describe the evolution, role, and characteristics of a Content Distribution Network (CDN) for delivering digital media to Internet points.

32.0 Demonstrate an understanding of the uses, technologies, standards, and protocols associated with digital signage.
33.0 Demonstrate an understanding of Internet Protocol Television (IPTV) systems, their types, applications, and implementation issues.

Florida Department of Education
Student Performance Standards

Program Title: Digital Media Technology
PSAV Number: Y500100

Course Number: OTA0040
Occupational Completion Point: A
Information Technology Assistant – 150 Hours – SOC Code 15-1151

Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: DIG0080 **Occupational Completion Point: B** **Digital Media Technician – 600 Hours – SOC Code 15-1142**	
15.0	Describe characteristics of digital media relative to format, standards, encoding schemes, and origin. – The student will be able to:
	15.01 Determine the meaning of symbols, key terms, and other domain-specific words and phrases.
	15.02 Identify and differentiate the appropriate use of digital media formats based on standard industry practices.
	15.03 Identify and differentiate the appropriate use of encoding schemes based on project needs.
	15.04 Identify the difference between digital media source files and digital media delivery systems.
16.0	Compare and contrast various forms of digital media delivery systems. – The student will be able to:
	16.01 Identify the differences between fixed digital media formats and digital media streaming.
	16.02 Identify the various forms of digital media content distribution.
	16.03 Describe the development of digital media technology as it pertains to digital signage.
	16.04 Describe the impact of mobile and Wi-Fi technologies on the digital media development industry.
17.0	Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital video. – The student will be able to:
	17.01 Identify digital image file types and their appropriate uses.
	17.02 Compare and contrast the similarities and differences between analog and digital recording.
	17.03 Describe the characteristics of digital video.
	17.04 Identify and describe the various application platforms used in digital video development.
18.0	Demonstrate an understanding of the characteristics, development medium, and technical aspects of digital audio. – The student will be able to:
	18.01 Identify and describe the fundamental aspects of sound theory.
	18.02 Compare and contrast the similarities and differences between analog and digital recording.
	18.03 Describe the characteristics of digital audio.
	18.04 Identify and describe the various application platforms used in digital audio recording and editing.
19.0	Explain the role of animation in digital media and the ways in which it is created and deployed. – The student will be able to:
	19.01 Describe the process of developing animations and identify the industry standard platforms used in their creation.
	19.02 Describe the similarities and differences as well as industry standard platforms used in the development of 2D and 3D graphics.

	19.03 Identify and describe the challenges in developing and deploying digital media content.
	19.04 Identify the components and characteristics of motion that make up an animation.
20.0	Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital video. – The student will be able to:
	20.01 Produce video files according to industry standard specifications using digital media development hardware and software applications.
	20.02 Identify and incorporate the appropriate use of digital video encoding based on industry standard practices.
	20.03 Identify the various tools and procedures utilized in the conversion of digital media file types.
	20.04 Demonstrate proficiency in the utilization of standard video production equipment.
	20.05 Demonstrate proficiency in the connectivity and configuration of digital video equipment.
	20.06 Identify and troubleshoot lighting issues as they pertain to the recording of digital video as well as describe common industry practices in the staging of light sources.
21.0	Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital audio. – The student will be able to:
	21.01 Produce audio files according to industry standard specifications using digital media development hardware and software applications.
	21.02 Demonstrate proficiency in the utilization of standard audio production equipment.
	21.03 Demonstrate proficiency in the connectivity and configuration of digital audio equipment.
22.0	Apply industry standard workflow management methods applicable to the integration and synchronization of audio and video into a single digital media product. – The student will be able to:
	22.01 Describe the various media integration systems and their appropriate uses in the development of digital media.
	22.02 Identify and describe the importance of version control in digital asset management.
	22.03 Identify and describe the various forms of digital audio / video synchronization and the tools and techniques used to sync digital audio and video.
23.0	Apply industry standard asset management methods applicable to development of a digital media product. – The student will be able to:
	23.01 Identify and describe the standard practices for storing and archiving digital media assets.
	23.02 Identify and describe the standard practices for retrieving digital media assets both on local and remote work stations / networks.
	23.03 Describe the standard practices for establishing digital asset security.
	23.04 Describe the purpose and function of metadata as it pertains to the management of digital assets.

24.0	Explain the importance of calibration in the production of digital media and the means by which it is accomplished. – The student will be able to:
	24.01 Identify the necessity and effects of calibration on various digital media systems.
	24.02 Identify standard practices in calibrating digital media production equipment.
25.0	Demonstrate proficiency in producing a digital media product for delivery using Digital Video Disc (DVD) media – The student will be able to:
	25.01 Identify and describe the various physical and application formats for (DVD) media technology.
	25.02 Identify and describe the various (DVD) physical outputs for media players.
	25.03 Identify the features and specifications of (DVD) media and the (DVD) format.
	25.04 Identify and describe the (DVD) media industry specification (red book standard).
	25.05 Identify and describe the various coding mechanisms utilized in the creation of (DVD) media.
	25.06 Identify and describe standard copy protection practices in (DVD) media creation.
	25.07 Use standard (DVD) authoring / editing systems in the creation of (DVD) media.
	25.08 Identify and describe the appropriate use of standard television formats (PAL & NTSC).
	25.09 Demonstrate an awareness of the issues in quality when compressing digital media.
26.0	Demonstrate proficiency in producing a digital media product for delivery using an Internet-based on-demand system (e.g., VOD, IPTV). – The student will be able to:
	26.01 Develop digital media in the appropriate specified format for delivery on On-Demand Systems.
	26.02 Develop digital media in the appropriate specified format for delivery on Video on demand (VOD) Systems.
	26.03 Develop digital media in the appropriate specified format for delivery on IP Television (IPTV).
27.0	Demonstrate proficiency in producing a digital media product for delivery using an Internet-based streaming system. – The student will be able to:
	27.01 Develop digital media in the appropriate specified format for delivery on On-Demand Systems.
	27.02 Develop digital media in the appropriate specified format for delivery on Video on demand (VOD) Systems.
	27.03 Develop digital media in the appropriate specified format for delivery on IP Television (IPTV).
	27.04 Develop digital media in the appropriate specified format for delivery on Grid Casting systems.

28.0	Demonstrate proficiency in producing a digital media product for delivery using an Internet-based system featuring multi-point presence. – The student will be able to:
28.01	Demonstrate an awareness of the tools and practices used in establishing multiple points of presence.
28.02	Demonstrate an awareness of design constraints and attributes as they pertain to producing digital media for delivery on internet-based systems.
28.03	Demonstrate an awareness of communication channels and considerations as they pertain to producing digital media for delivery on internet-based systems.
29.0	Demonstrate proficiency in producing a digital media product for delivery using mobile communication devices. – The student will be able to:
29.01	Develop digital media in the appropriate specified format for delivery on smart phones.
29.02	Develop digital media in the appropriate specified format for delivery on tablet PC.
29.03	Develop digital media in the appropriate specified format for delivery on laptops.
29.04	Demonstrate an awareness of Bluetooth considerations as they pertain to the production of digital media for delivery on mobile communication devices.
29.05	Demonstrate an awareness of security / privacy issues as they pertain to the production of digital media for delivery on mobile communication devices.
29.06	Demonstrate an awareness of Personalization (e.g., digital identities, authentication) as it pertains to mobile security.
29.07	Demonstrate an awareness of data portability issues as they pertain to the production of digital media for delivery on mobile communication devices.
29.08	Demonstrate an awareness of Social Application Programming Interfaces (e.g., OpenSocial).
30.0	Demonstrate proficiency in producing a digital media product for delivery using satellite delivery systems. – The student will be able to:
30.01	Identify industry applications utilized in producing a digital media product for delivery using satellite delivery systems.
30.02	Identify current technologies and capabilities used in the production of a digital media product for delivery using satellite delivery systems.
30.03	Describe the current limitations (e.g. latency) of delivering digital media via satalite delivery systems.
30.04	Identify and describe common issues in delivering digital media via simulcast systems.
30.05	Identify and describe the process of delivering digital media via mulitcast systems.
31.0	Describe the evolution, role, and characteristics of a Content Distribution Network (CDN) for delivering digital media to Internet points. – The student will be able to:
31.01	Describe content networking techniques as they pertain to the delivering of digital media to internet points.
31.02	Describe common practices and protocols (e.g., ICAP, OPES) in digital media development.

	31.03	Describe common practices in digital media development as they pertain to the synchronization and loading of digital content across a content distribution network (CDN).	
	31.04	Describe common practices in establishing asset security with respect to delivering digital media to content distribution networks (CDN).	
32.0	Demonstrate an understanding of the uses, technologies, standards, and protocols associated with digital signage. – The student will be able to:		
	32.01	Demonstrate an understanding of digital signage uses and applications.	
	32.02	Demonstrate an understanding of digital signage standards (e.g., SMIL).	
	32.03	Demonstrate an understanding of common protocols (e.g., SMS, Bluetooth) used in the distribution of digital media to digital signage.	
	32.04	Demonstrate an understanding of display media technology.	
		32.04.1	Demonstrate an understanding of the technology associated with conventional displays (LCD, LED, Plasma).
		32.04.2	Demonstrate an understanding of the technology associated with holographic displays.
		32.04.3	Demonstrate an understanding of the technology associated with 3D Displays.
		32.04.4	Demonstrate an understanding of the technology associated with large-scale displays.
	32.05	Demonstrate an understanding of content playback and management as it pertains to the use of digital media via digital signage.	
	32.06	Demonstrate an understanding of Network Infrastructure.	
	32.07	Demonstrate an understanding of Ethernet network protocols.	
		32.07.1	Demonstrate an understanding of Wireless (e.g., Wi-Fi, Bluetooth) network protocols.
		32.07.2	Demonstrate an understanding of digital signage multi-unit synchronization.
33.0	Demonstrate an understanding of Internet Protocol Television (IPTV) systems, their types, applications, and implementation issues. – The student will be able to:		
	33.01	Demonstrate an understanding of converged services and their application to Internet Protocol Television (IPTV).	
	33.02	Compare and contrast live versus stored media systems.	
	33.03	Demonstrate an understanding of Internet Protocol Television (IPTV) applications and delivery systems.	
	33.04	Demonstrate an understanding of common issues that pertain to the development of digital media for distribution over Internet Protocol Television (IPTV) systems.	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 10, and Reading 10. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Course Title: **Information Technology Cooperative Education - OJT**
Course Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV – Cooperative Education - OJT	
Course Number	Y509999
CIP Number	05119999CP
Grade Level	30, 31
Standard Length	Multiple hours
Teacher Certification	BUS ED 1 @2 INFO TECH 7G WEB DEV 7G COMP PROG 7G CYBER TECH 7G DIGI MEDIA 7G
CTSO	Phi Beta Lambda BPA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology cluster.

Each student job placement must be related to the job preparatory program in which the student is enrolled or has completed.

The purpose of this course is to provide the on-the-job training component when the **cooperative method of instruction** is appropriate. Whenever the cooperative method is offered, the following is required for each student: a training agreement; a training plan signed by the student, teacher and employer, including instructional objectives; a list of on-the-job and in-school learning experiences; a workstation which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal; and a site supervisor with a working knowledge

of the selected occupation. The workstation may be in an industry setting or in a virtual learning environment. The student **must be compensated** for work performed.

The teacher/coordinator must meet with the site supervisor a minimum of once during each grading period for the purpose of evaluating the student's progress in attaining the competencies listed in the training plan.

Information Technology Cooperative Education - OJT may be taken by a student for one or more semesters. A student may earn multiple credits in this course. The specific student performance standards which the student must achieve to earn credit are specified in the Cooperative Education - OJT Training Plan.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform designated job skills.
02.0 Demonstrate work ethics.

Florida Department of Education
Student Performance Standards

Program Title: **Information Technology Cooperative Education OJT**
PSAV Number: **Y509999**

Standards and Benchmarks	
01.0	Perform designated job skills. – The student will be able to:
01.01	Perform tasks as outlined in the training plan.
01.02	Demonstrate job performance skills.
01.03	Demonstrate safety procedures on the job.
01.04	Maintain appropriate records.
01.05	Attain an acceptable level of productivity.
01.06	Demonstrate appropriate dress and grooming habits.
02.0	Demonstrate work ethics. – The student will be able to:
02.01	Follow directions.
02.02	Demonstrate good human relations skills on the job.
02.03	Demonstrate good work habits.
02.04	Demonstrate acceptable business ethics.

Additional Information

Special Notes

There is a **Cooperative Education Manual** available online that has guidelines for students, teachers, employers, parents and other administrators and sample training agreements. It can be accessed on the DOE website at http://www.fldoe.org/core/fileparse.php/3/urlt/steps-manual.pdf.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Web Development**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y700100
CIP Number	0511080100
Grade Level	30, 31
Standard Length	1050 hours
Teacher Certification	BUS ED 1 @2 VOE @7 TC COOP ED @7 BUS DP @7 %G ELECT DP @7 %G CLERICAL @7 7G SECRETAR 7G STENOG @4 TEC ELEC $7 G COMP SCI 6 COMM ART @7 7G WEB DEV 7 G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1199 – Computer Occupations, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as an Assistant Web Designer, a Web Designer, and Senior Web Designer in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to operating system commands and web document development, design, promotion and scripting.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	CTS0070 CTS0071	Web Design Foundations Web Interface Design	150 hours 150 hours	15-1199
C	CTS0049 CTS0015	Web Scripting Web Media Integration	150 hours 150 hours	15-1199
D	CTS0016 CTS0017	Web E-commerce Web Interactivity	150 hours 150 hours	15-1199

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Demonstrate proficiency in website planning and the design process.
16.0 Develop markup language structures.
17.0 Create basic web pages.
18.0 Incorporate images and graphical formatting on a webpage.
19.0 Create a basic table structure.
20.0 Incorporate form structures in a webpage.
21.0 Describe frame structures and their usage.
22.0 Use Cascading Style Sheets (CSS).
23.0 Examine web design technologies and techniques.
24.0 Describe the process for publishing a website.
25.0 Describe how website performance is monitored and analyzed.
26.0 Create an informational website.
27.0 Demonstrate language arts knowledge and skills.
28.0 Demonstrate mathematics knowledge and skills.
29.0 Incorporate Human Computer Interface (HCI) principles of design.
30.0 Research and obtain information for use in designing the user interface.
31.0 Create an intuitive interface using Cascading Style Sheets (CSS).
32.0 Demonstrate proficiency creating a logical website file structure.

33.0 Create a CSS formatted informational website.
34.0 Demonstrate proficiency publishing, testing, monitoring, and maintaining a website.
35.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
36.0 Solve problems using critical thinking skills, creativity and innovation.
37.0 Use information technology tools.
38.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
39.0 Describe the importance of professional ethics and legal responsibilities.
40.0 Discuss the differences between server-side and client-side scripting.
41.0 Compare and contrast client-side scripting languages (JavaScript, VBScript, and ECMAScript).
42.0 Demonstrate understanding of the Document Object Model (DOM).
43.0 Design, write, debug, and incorporate a JavaScript client-side script into a webpage.
44.0 Incorporate basic JavaScript form validation and form handling (using pre-built validation scripts or online libraries).
45.0 Use advanced JavaScript techniques.
46.0 Demonstrate understanding of JavaScript accessibility issues.
47.0 Select and modify appropriate library and pre-built JavaScript to incorporate into webpage.
48.0 Incorporate graphics, animations, and video assets into a webpage design using conventional HTML techniques.
49.0 Demonstrate understanding of XML vocabularies and documents.
50.0 Create and debug an XML Document.
51.0 Create and debug compound documents with Namespaces.
52.0 Demonstrate ability to validate documents with a Data Type Definition (DTD).
53.0 Demonstrate ability to validate documents with XML Schema.
54.0 Demonstrate an understanding of Asynchronous JavaScript and XML (AJAX) and its implications for web developers.
55.0 Plan and implement a multi-page website that features graphics, pictures, and video galleries using AJAX techniques.
56.0 Demonstrate knowledge and skills necessary to setup a secure E-commerce site.
57.0 Identify security issues associated with E-commerce and discuss methods to mitigate risks.
58.0 Apply skills necessary to setup an E-commerce storefront.
59.0 Employ techniques to enhance the value and profitability of an E-commerce website.
60.0 Develop an evaluation and performance monitoring framework featuring established metrics and target goals for an E-commerce website.
61.0 Demonstrate an understanding of Content Management Systems (CMS) and their implications for web development.
62.0 Use CMS features, functions, and extensions/modules to create/enhance a website.
63.0 Evaluate the suitability for and system requirements for a content management system.
64.0 Demonstrate an understanding of multimedia applications and their implications for web designers.
65.0 Create and incorporate interactive website components.
66.0 PDF document usage considerations.
67.0 Create, format, and manipulate PDF documents.
68.0 Display, distribution, and print considerations for PDF documents.
69.0 Create and manage PDF forms.
70.0 Incorporate PDF security in a PDF document.
71.0 Demonstrate proficiency using HTML5 features and functions.

Florida Department of Education
Student Performance Standards

Program Title: **Web Development**
PSAV Number: **Y700100**

Course Number: OTA0040
Occupational Completion Point: A
Information Technology Assistant – 150 Hours – SOC Code 15-1151

Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: CTS0070 **Occupational Completion Point: B** **Web Design Foundations (Assistant Web Designer) – 150 Hours – SOC Code 15-1199**
15.0 Demonstrate proficiency in website planning and the design process. – The student will be able to:
15.01 Define information architecture.
15.02 Discuss the importance of information architecture to web design and development.
15.03 Conduct a client interview to determine the business purpose of the new web site and the primary goals.
15.04 Conduct a competitive analysis.
15.05 Identify stages in the web design process and describe the activities comprising each stage.
15.06 Define the site structure by creating a content map, storyboard, and associated wireframes.
15.07 Create a global site map.
15.08 Discuss the legal and ethical issues related to web design.
15.09 Describe accessibility and its implications on web design.
15.10 Create a web site mock-up for client approval.
16.0 Develop markup language structures. – The student will be able to:
16.01 Define common markup languages and their usage.
16.02 Examine emerging and new markup languages.
16.03 Determine browser support and appropriate usage of markup languages (existing and emerging).
16.04 Identify common DOCTYPES (e.g., Strict, Transitional and Frameset) and describe their appropriate use.
17.0 Create basic webpages. – The student will be able to:
17.01 Create basic webpage structures using common markup elements and attributes.
17.02 Incorporate list structures in a webpage (i.e., ordered, unordered, definition, nested).
17.03 Incorporate link structures in a webpage (i.e., external, internal, email).
17.04 Research and incorporate web color usage principles in a webpage.
17.05 Troubleshoot markup language syntax, elements, and links.

18.0	Incorporate images and graphical formatting on a webpage. – The student will be able to:
18.01	Describe usage guidelines (e.g., format types, size, relevance) for integrating images and graphics onto a webpage.
18.02	Compare and contrast standard image formats used in webpage design.
18.03	Incorporate graphics into a webpage design.
18.04	Create and incorporate image maps in a webpage.
18.05	Optimize images and graphics for use in a webpage.
19.0	Create a basic table structure. – The student will be able to:
19.01	Describe how tables are used in web design.
19.02	Discuss the advantages and disadvantages of incorporating tables in a webpage design.
19.03	Define and modify table structures for the presentation of tabular information.
19.04	Create accessible tables using standard table elements and attributes.
20.0	Incorporate form structures in a webpage. – The student will be able to:
20.01	Create an accessible form using common elements, including form, fieldset, legend, textarea, select, option, button, and input (radio, checkbox, submit, reset, image, password, hidden).
20.02	Describe and diagram the relationship between XHTML forms and server-side technologies.
20.03	Compare and contrast the GET and POST methods for forms handling.
20.04	Define form validation and describe how it is accomplished.
20.05	List popular server-side technologies often used to process content sent from XHTML forms.
20.06	Use labels with form elements.
20.07	Connect a XHTML form to a server-side script for processing.
21.0	Describe frame structures and their usage. – The student will be able to:
21.01	Explore frame and iframe structures and support issues.
21.02	Describe appropriate uses of iframes.
21.03	Incorporate frame structure in a webpage.

22.0	Use Cascading Style Sheets (CSS). – The student will be able to:
22.01	Define CSS and describe its importance in web design.
22.02	Compare and contrast existing and emerging CSS versions.
22.03	Determine browser support and appropriate usage of CSS (existing and emerging versions).
22.04	Explain "document flow" and describe its implications on web design.
22.05	Recognize and use element selectors, ID selectors, class selectors, pseudo-class selectors, and descendant selectors.
22.06	Explain how inheritance and specificity affect CSS rule conflicts.
22.07	Use inline styles, embedded style sheets, and external style sheets.
22.08	Use the link and import methods to connect to an external style sheet.
22.09	Use CSS shorthand techniques to create efficient and concise style sheets.
22.10	Apply basic CSS properties, including background, border, clear, color, float, font, height, line-height, list-style, margin, overflow, padding, position, text-align, text-indent, width, z-index and padding.
22.11	Use CSS to style tables (e.g., borders, width, spacing, alignment, background).
22.12	Use CSS to enhance the appearance and usability of an XHTML form.
23.0	Examine web design technologies and techniques. – The student will be able to:
23.01	Compare and contrast common authoring tools.
23.02	Compare and contrast client-side and server-side technologies.
23.03	Define e-commerce types and usage.
23.04	Describe database connectivity relative to websites.
23.05	Identify technologies to enhance user experience.
24.0	Describe the process for publishing a website. – The student will be able to:
24.01	Explore domain name selection principles.
24.02	Identify process to registering a domain name.
24.03	Compare and contrast hosting providers, features, and selection criteria.
24.04	Describe the various means for uploading website files (e.g., FTP, web-based tools).

25.0	Describe how website performance is monitored and analyzed. – The student will be able to:
	25.01 Identify issues related to website maintenance.
	25.02 Use webpage validation tools.
	25.03 Describe website performance metrics (e.g., visits, time-on-page, time-on-site) and discuss their design implications.
	25.04 Demonstrate knowledge of accessibility problems and solutions.
	25.05 Examine indexing, page ranking, basic Search Engine Optimization techniques.
	25.06 Explore common website analytic tools.
26.0	Create an informational website. – The student will be able to:
	26.01 Use GUI (Graphical User Interface) web authoring software to create a multi-page informational website.
	26.02 Use image-editing software to enhance website designs with simple graphics.
	26.03 Use animation software to enhance website designs.
	26.04 Enhance the website using client-side technologies (rollovers, check plug-ins, pop-up windows).
	26.05 Demonstrate efficient, consistent web site development practice (use of templates, snippets).
27.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	27.01 Locate, comprehend and evaluate key elements of oral and written information.
	27.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	27.03 Present information formally and informally for specific purposes and audiences.
28.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	28.01 Demonstrate knowledge of arithmetic operations.
	28.02 Analyze and apply data and measurements to solve problems and interpret documents.
	28.03 Construct charts/tables/graphs using functions and data.

Course Number: CTS0071 **Occupational Completion Point: B** **Web Interface Design (Assistant Web Designer) – 150 Hours – SOC Code 15-1199**	
29.0	Incorporate Human Computer Interface (HCI) principles of design. – The student will be able to:
29.01	Describe the fundamental design principles of human computer interface.
29.02	Differentiate between computer and human factors in screen/page design.
29.03	Describe what is meant by an “intuitive” interface.
29.04	Describe how typography, color scheme, and graphic usage are used to set website feel/tone for various types of websites (e.g., educational, entertainment, ecommerce).Identify and use the following design concepts: contrast, repetition, alignment, proximity, writing style.
29.05	Identify and use the following design concepts: contrast, repetition, alignment, proximity, writing style.
29.06	Define and establish logo, identity, and branding needed for an effective website.
29.07	Evaluate the HCI features included on a webpage storyboard.
29.08	Create a series of webpage storyboards that incorporate HCI design principles.
30.0	Research and obtain information for use in designing the user interface. – The student will be able to:
30.01	Identify common user information needs, information gathering models, and methods for gathering user research.
30.02	Define the primary audience and customer expectations and develop a rubric for defining user tasks and corresponding functionality.
30.03	Describe target audience preferences based on demographics (e.g., gender, age, economic status, culture).
30.04	Identify and use web analytic tools to shape an information architecture strategy (determine keywords).
30.05	Apply the results of research and analytics to the design of a user interface.
31.0	Create an intuitive interface using Cascading Style Sheets (CSS). – The student will be able to:
31.01	Create CSS styles suitable for use on an intuitive webpage interface.
31.02	Use element selectors, ID selectors, class selectors, pseudo-class selectors, and descendant selectors to create a table-less webpage design.
31.03	Create a series of templates formatted exclusively using CSS.
31.04	Use CSS syntax to configure and apply style sheets for multiple media displays (e.g., screen display and print).
31.05	Create webpage templates using advanced CSS methods (e.g., create multi-column layouts, mimic client-side technologies, create

	faux columns).
31.06	Differentiate among static, relative, absolute, and fixed positioning schemas.
31.07	Use schemas to design a website: fixed, liquid, elastic designs.
31.08	Recognize browser support for static, relative, absolute, and fixed positioning schemas.
31.09	Identify and correct display issues in a web page using multiple browsers.
32.0	Demonstrate proficiency creating a logical website file structure. – The student will be able to:
32.01	Create an efficient, maintainable directory structure for a website, including the site root and subfolders for assets (e.g., images, templates, CSS).
32.02	Demonstrate and use correct file paths for relative, site root relative, and absolute links.
33.0	Create a CSS formatted informational website. – The student will be able to:
33.01	Use GUI (Graphical User Interface) web authoring software to create a multi-page informational website.
33.02	Create documented CSS style sheets for layout and appearance purposes.
33.03	Incorporate methods used to drive traffic to the website, then engage and retain visitors.
33.04	Apply standard optimization practices (e.g., keyword proximity; density; relevance; appropriate page titles, URLs, and headings, alt tags) to enhance search engine performance.
33.05	Use standard design techniques to correctly display a website using multiple browsers (e.g., box model, hasLayout, Internet Explorer Conditional Comments (IECC)).
33.06	Integrate common multimedia and plug-ins as appropriate to enhance a website design.
33.07	Use client-side technologies such as rollovers, check plug-ins, and pop-up windows to enhance the user interface.
34.0	Demonstrate proficiency publishing, testing, monitoring, and maintaining a website. – The student will be able to:
34.01	Recognize the relationship between local and remote site structure.
34.02	Identify methods of acquiring a domain name, appropriate hosting, and search engine registry.
34.03	Understand and implement strategies to measure website traffic and improve search engine analytics reports.
34.04	Describe the use of standard web marketing technologies (e.g., blogging, podcasting).
34.05	Describe how social media and social networking sites can be used for marketing purposes.
34.06	Test websites using common resolutions, browsers, accessibility, and validation techniques.

	34.07	Use popular Internet browsers and tools as defined by W3C Browser Statistics (e.g., Mozilla Firefox (Web Developer Toolbar, ColorZilla, MeasureIt, Firebug), Internet Explorer 7/8) to display and troubleshoot websites.
	34.08	Explore standard practices for feedback and usability testing.
	34.09	Identify and incorporate standard security measures in a website.
	34.10	Identify and use online validation tools.
	34.11	Successfully change invalid markup to comply with standards.
	34.12	Build a webpage that successfully passes the W3C validation test at http://validator.w3.org.
	34.13	Write markup that facilitates accessibility.
	34.14	Use FTP to transfer files to a server.
	34.15	Set up an FTP connection to a remote site and reproduce the site structure on the server.
35.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:	
	35.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	35.02	Locate, organize and reference written information from various sources.
	35.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	35.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.
	35.05	Apply active listening skills to obtain and clarify information.
	35.06	Develop and interpret tables and charts to support written and oral communications.
	35.07	Exhibit public relations skills that aid in achieving customer satisfaction.
36.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:	
	36.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.
	36.02	Employ critical thinking and interpersonal skills to resolve conflicts.
	36.03	Identify and document workplace performance goals and monitor progress toward those goals.
	36.04	Conduct technical research to gather information necessary for decision-making.
37.0	Use information technology tools. – The student will be able to:	
	37.01	Use personal information management (PIM) applications to increase workplace efficiency.
	37.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.

	37.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	37.04 Employ collaborative/groupware applications to facilitate group work.
38.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
	38.01 Describe the nature and types of business organizations.
	38.02 Explain the effect of key organizational systems on performance and quality.
	38.03 List and describe quality control systems and/or practices common to the workplace.
	38.04 Explain the impact of the global economy on business organizations.
39.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	39.01 Evaluate and justify decisions based on ethical reasoning.
	39.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	39.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	39.04 Interpret and explain written organizational policies and procedures.

Course Number: CTS0049 **Occupational Completion Point: C** **Web Scripting (Web Designer) – 150 Hours – SOC Code 15-1199**	
40.0	Discuss the differences between server-side and client-side scripting. – The student will be able to:
40.01	Describe the role scripting languages play in the creation of websites.
40.02	Identify and describe the advantages, disadvantages, and primary uses of popular scripting languages (e.g., JavaScript, VBScript, Perl, PHP, JScript).
41.0	Compare and contrast client-side scripting languages (JavaScript, VBScript, and ECMAScript). – The student will be able to:
41.01	Describe the primary usage and limitations of JavaScript in a web environment.
41.02	Describe how JavaScript blends with other web-authoring technologies (i.e., HTML, CSS, Server-side programming, Plug-ins).
41.03	Describe the primary differences between JavaScript and VBScript.
41.04	Describe the source, features, and common uses of ECMAScript.
41.05	Explain why JavaScript use far exceeds VBScript for client-side scripting.
41.06	Research resources available to advance JavaScript knowledge.
41.07	Explore emerging trends and upcoming revisions related to JavaScript.
42.0	Demonstrate understanding of the Document Object Model (DOM). – The student will be able to:
42.01	Describe the purpose of the Document Object Model (layout, objects, properties, and methods).
42.02	Describe how JavaScript uses the DOM to detect and manipulate elements on a webpage.
43.0	Design, write, debug, and incorporate a JavaScript client-side script into a webpage. – The student will be able to:
43.01	Write, analyze and explain JavaScript syntax.
43.02	Describe usage of various data types.
43.03	Describe how the use of decision-making logic (AND, OR) is employed in a JavaScript program.
43.04	Create and use variables, operators, and expressions.
43.05	Use common JavaScript events and event handlers (e.g., click, load, onClick, onLoad) to control program flow, appearance, or functionality.
43.06	Understand and incorporate JavaScript arrays (e.g., array basics, types, usage, methods, sorting).
43.07	Understand and incorporate JavaScript functions (e.g., using the DOM, pass a value, return value, create objects, work with classes and objects).

	43.08 Understand and incorporate JavaScript loops and conditions (e.g., loop basics, types, usage).
	43.09 Recognize, isolate, and correct common JavaScript errors (e.g., syntax, function errors, reserved word usage, unsupported DOM).
	43.10 Identify limitations related to obsolete JavaScript constructs and coding practices (e.g., Document.all, navigator.appName).
	43.11 Apply JavaScript best coding practices (i.e., properly documenting scripts, field naming conventions, writing understandable code).
	43.12 Use different methods to incorporate JavaScript onto a web page (e.g., <script> element, JavaScript statement block, external scripts).
	43.13 Troubleshoot and test incorporated script (i.e., functionality, browser usage, resolve known bugs).
44.0	Incorporate basic JavaScript form validation and form handling (using pre-built validation scripts or online libraries). – The student will be able to:
	44.01 Identify and use form elements to solicit user input.
	44.02 Use JavaScript with HTML form controls.
	44.03 Validate web forms prior to submission.
	44.04 Use output commands to display processed data in an appropriately formatted form.
45.0	Use advanced JavaScript techniques. – The student will be able to:
	45.01 Write JavaScript suitable for plug-in detection, image manipulation, and the creation of custom JavaScript objects.
	45.02 Use JavaScript to incorporate, create, update, and delete cookies.
	45.03 Describe the common security issues relevant to JavaScript.
46.0	Demonstrate understanding of JavaScript accessibility issues. – The student will be able to:
	46.01 Describe the purpose of the Browser Object Model (BOM) and how it relates to JavaScript.
	46.02 Describe how obsolete constructs and coding practices affect browser function.
	46.03 Make webpages accessible and functional when JavaScript disabled or unsupported.
	46.04 Demonstrate ability to use XHTML, HTML, and CSS instead of JavaScript where appropriate.
	46.05 Demonstrate ability to determine which version of JavaScript specific browsers support and code program to meet acceptable standards.
47.0	Select and modify appropriate library and pre-built JavaScript to incorporate into webpage. – The student will be able to:
	47.01 Explore common JavaScript libraries and describe the advantages & disadvantages of using libraries.
	47.02 Analyze pre-built library items to determine functionality.

47.03	Explain how a library item achieves desired processing.
47.04	Determine if pre-built script provides functionality required in an effective manner.
47.05	Incorporate pre-built library items into web pages.
47.06	Identify the restrictions related to using pre-built scripts (i.e.; copyright, processing, length of script).
47.07	Modify pre-built scripts to suit functionality requirements.
47.08	Test and troubleshoot pre-built scripts and widgets incorporated into web pages.

Course Number: CTS0015 **Occupational Completion Point: C** **Web Media Integration (Senior Web Designer) – 150 Hours – SOC Code 15-1199**	
48.0	Incorporate graphics, animations, and video assets into a webpage design using conventional HTML techniques. – The student will be able to:
48.01	Use the HREF tag to integrate a video file displayed in a new window.
48.02	Use the EMBED tag to display a graphic animation or a video file as part of the webpage fabric.
48.03	Discuss the limitations of conventional media integration techniques.
49.0	Demonstrate understanding of XML vocabularies and documents. – The student will be able to:
49.01	Understand XML vocabularies.
49.02	Define well-formed and valid XML documents.
49.03	Describe the basic structure of an XML document.
50.0	Create and debug an XML document. – The student will be able to:
50.01	Create an XML declaration.
50.02	Work with XML comments.
50.03	Create XML elements and attributes.
50.04	Work with character and entity references.
50.05	Describe how XML handles character data, parsed character data, and white space.
50.06	Work with XML parsers.
50.07	Understand how Web browsers work with XML documents.
50.08	Apply a style sheet to an XML document.
50.09	Create an XML processing instruction.
51.0	Create and debug compound documents with Namespaces. – The student will be able to:
51.01	Understand compound documents and the problem of name collision.
51.02	Declare a namespace for an XML vocabulary.
51.03	Apply a namespace to an element.

51.04	Create a default namespace.
51.05	Apply a namespace to an attribute.
51.06	Declare a namespace within a CSS style sheet.
51.07	Apply a namespace to a style selector.
51.08	Use the escape character to apply a namespace to a selector.
51.09	Create a compound document containing XML and XHTML elements and attributes.
52.0	Demonstrate ability to validate documents with a Data Type Definition (DTD). – The student will be able to:
52.01	Understand the principles of data validation.
52.02	Create a DOCTYPE.
52.03	Specify the content of an XML element.
52.04	Define the structure of child elements.
52.05	Describe how DOCTYPE changed from HTML4.01 to HTML5.
53.0	Demonstrate ability to validate documents with XML Schema. – The student will be able to:
53.01	Compare schemas and DTDs.
53.02	Explore different schema vocabularies.
53.03	Declare simple type elements and attributes.
53.04	Declare complex type elements.
53.05	Apply a schema to an instance document.
53.06	Work with XML Schema data types.
53.07	Derive new data types for text strings, numeric values, and dates.
53.08	Create data types for patterned data using regular expressions.
53.09	Explore different schema structures.
53.10	Attach a schema to a namespace.
53.11	Validate compound instance documents.
53.12	Import one schema file into another.

54.0	Demonstrate an understanding of Asynchronous JavaScript and XML (AJAX) and its implications for web developers. – The student will be able to:
54.01	Identify the technologies that comprise AJAX and explain how they interact.
54.02	Describe the purpose, advantages, disadvantages, and functions of AJAX.
54.03	Describe how AJAX works and how it is used in the creation of websites.
54.04	Identify AJAX requirements.
54.05	Install and setup the AJAX Control Toolkit.
54.06	Define appropriate use of AJAX in a web project.
54.07	Identify AJAX Usability and Accessibility issues and their workarounds.
54.08	Describe AJAX related browser compatibility issues and their workarounds.
54.09	Explore popular AJAX applications currently on the Internet (auto-complete (Google), updating user content (Twitter), voting and rating (social bookmarking))
54.10	Describe common security issues associated to AJAX.
54.11	Analyze the server-side implications of AJAX applications.
54.12	Explore methods for testing and maintaining an AJAX application.
54.13	Explore the future of AJAX and its implementation.
55.0	Plan and implement a multi-page website that features graphics, pictures, and video galleries using AJAX techniques. – The student will be able to:
55.01	Research AJAX design principles and patterns (e.g., Observer, Command, MVC).
55.02	Research and compare popular AJAX frameworks, libraries, and toolkits (e.g., JQuery, DOJO, Prototype).
55.03	Identify and implement methods of using AJAX when JavaScript not available (e.g. progressive enhancement).
55.04	Update specific areas of a page with data from the server (e.g., server-login updated) without reloading the webpage.
55.05	Demonstrate the ability to output results in different formats (e.g., XML, JSON, alternatives to JavaScript).
55.06	Use AJAX to create form submission & validation (e.g. password strength check, email/URL validation).
55.07	Integrate a basic slideshow via lightbox using AJAX techniques.
55.08	Integrate optional video selections displayed using AJAX techniques.

Course Number: CTS0016 **Occupational Completion Point: D** **Web E-commerce (Senior Web Designer) – 150 Hours – SOC Code 15-1199**	
56.0	Demonstrate knowledge and skills necessary to setup a secure E-commerce site. – The student will be able to:
56.01	Compare and contrast popular pre-built shopping cart software (e.g., PrestaShop, Zend Cart).
56.02	Compare and contrast hosting options available for use with shopping cart software (i.e., shared hosting or dedicated server).
56.03	Discuss shopping cart vulnerabilities and best-practice preventative measures.
56.04	Identify hardware and software necessary to install and setup pre-built shopping cart software.
56.05	Install and configure necessary software (database, server) to run pre-built shopping cart software.
56.06	Install and configure pre-built shopping cart software.
56.07	Verify database and server connectivity.
56.08	Test and troubleshoot setup/configuration issues.
57.0	Identify security issues associated with E-commerce and discuss methods to mitigate risks. – The student will be able to:
57.01	Describe the differences between Transaction Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL).
57.02	Explain transaction security.
57.03	Identify security and payment processing issues involved in developing a site (e.g., SSL, Digital Certificates, SET Protocol, Cyber Cash).
57.04	Demonstrate understanding of https and htaccess and their usage.
57.05	Explore methods to obtain an SSL certificate and secure transactions.
57.06	Compare and contrast the appropriateness of employing a merchant account or a payment gateway to handle online transactions.
57.07	Discuss the process, advantages, disadvantages, and costs associated with opening a merchant account.
57.08	Describe the process, advantages, disadvantages, and costs associated with using a payment gateway.
58.0	Apply skills necessary to setup an E-commerce storefront. – The student will be able to:
58.01	Setup and use an FTP (File Transfer Protocol) program to transfer files to a web server.
58.02	Add business specific information to site storefront (e.g., logos, product images, descriptions).
58.03	Setup back-end site administration functions and navigation.

58.04	Setup a schema for incorporating shipping, handling, and processing fees based on carrier, geographical zones, and weight/price range.
58.05	Experiment with various add-ons, themes, and modules available for customization.
58.06	Customize shopping cart to suit client needs (e.g., modify fields, add buttons).
58.07	Customize forms to accommodate client products and/or services.
58.08	Setup Search preferences and functionality for products and/or services.
58.09	Setup customer contact preferences and email notification functionality.
58.10	Apply Search Engine Optimization (SEO) techniques to shopping cart pages.
58.11	Test operation of shopping cart pages in multiple browsers.
58.12	Troubleshoot issues and errors related to browser display and functionality.
59.0	Employ techniques to enhance the value and profitability of an E-commerce website. – The student will be able to:
59.01	Determine business goals for the E-commerce site.
59.02	Identify the various types of advertising options in E-commerce (e.g., links, banner ads, affiliate programs, pop-up windows, viral marketing, newsgroup postings).
59.03	Describe affiliate marketing and its implications for E-commerce websites.
59.04	Analyze popular affiliate programs/networks and available payment schemes.
59.05	Explain the differences, advantages, and disadvantages of CPM, PPC, and Pay per Sale/Lead.
59.06	Determine appropriate affiliate program for target audience.
59.07	Identify the method to join an affiliate program/network.
59.08	Identify considerations/requirements of selecting an affiliate program.
59.09	Determine appropriate number of affiliate programs necessary to suit client site.
59.10	Determine the terms and conditions of sale, including warranties, after-sales service, and privacy assurances.
59.11	Determine customer service options (e.g., e-mail, phone, fax).
59.12	Create a site map.
59.13	Create a Frequently Asked Questions (FAQ) page.
59.14	Create a product/version comparison chart, where appropriate.
59.15	Create feedback, review, survey, and recommendation pages.

60.0	Develop evaluation and performance monitoring frameworks featuring established metrics and target goals for an E-commerce website. – The student will be able to:
60.01	Research existing and emerging analytical, usability, SEO tools to improve customer satisfaction and site conversion rates.
60.02	Describe web analytics tools and their features/functions.
60.03	Use web analytics tools to determine optimum site keywords.
60.04	Experiment with using advanced segments to view subsets of data (relating to purchasing habits, website usage, searches).
60.05	Customize analytic reports using appropriate metrics (e.g., average per-visit value, bounce rates, time spent on page).
60.06	Create more concise reports using advanced filters in web analytics tools.
60.07	Use intelligence features of web analytics tools to discover patterns of usage and setup corresponding alerts.
60.08	Research popular mobile analytics tools (e.g., Motally) and their features.
60.09	Interpret analytic report data and optimize website accordingly, if appropriate.

Course Number: CTS0017 **Occupational Completion Point: D** **Web Interactivity (Senior Web Designer) – 150 Hours – SOC Code 15-1199**	
61.0	Demonstrate an understanding of Content Management Systems (CMS) and their implications for web development. – The student will be able to:
61.01	Describe the fundamental operation of a CMS.
61.02	Describe the typical features of a content management system.
61.03	Compare and contrast popular CMS applications (e.g., WordPress, Joomla).
61.04	Describe how a content management system can be used to enhance website interactivity.
61.05	Demonstrate proficiency installing and configuring content management systems and extensions/modules.
62.0	Use CMS features, functions, and extensions/modules to create/enhance a website. – The student will be able to:
62.01	Create a basic multipage website using a content management system.
62.02	Enhance a webpage by using a content management system to incorporate images, animations, or video segments.
62.03	Incorporate a blog feature into a website using a content management system.
62.04	Demonstrate proficiency using CMS built-in security for website, password and database backup.
62.05	Demonstrate proficiency using add-on modules, or plug-ins.
63.0	Evaluate the suitability for and system requirements for a content management system. – The student will be able to:
63.01	Identify business goals and evaluate their suitability for a content management system.
63.02	Determine web hosting system requirements.
63.03	Create a schema for creating, deleting, and managing users and their permissions.
63.04	Discuss the value represented by templates in a content management system development environment.
64.0	Demonstrate an understanding of multimedia applications and their implications for web designers. – The student will be able to:
64.01	Compare and contrast the leading multimedia development applications for website development (e.g., Adobe Flash, Microsoft Silverlight).
64.02	Describe those circumstances whereby multimedia may be used to add interactivity to a website.
64.03	Describe the limitations of multimedia development applications relative to website development.

65.0	Create and incorporate interactive website components. – The student will be able to:
65.01	Create buttons, menus, and other components that feature a static, hover, and rollover effect.
65.02	Convert original artwork into an interactive component with associated script behavior.
65.03	Adjust the component properties including opacity, filter, rotation, and action.
65.04	Resize a multi-layer component to ensure uniform resizing of each layer.
65.05	Create scrolling images, panels, and lists for incorporating into a web design.
65.06	Create and incorporate animated banners, headers, and website introduction pages (e.g., Adobe Flash, Microsoft Silverlight).
66.0	PDF document usage considerations. – The student will be able to:
66.01	Discuss the advantages and disadvantages of using PDF documents in a web site.
66.02	Research and discuss PDF document usage best practices.
66.03	Determine when it is appropriate to use PDF documents (e.g., brochure downloads, large reports, catalogs, interactive forms).
66.04	Compare and contrast the functionality of software applications used to create and process PDFs.
66.05	Research and describe search engine optimization considerations related to the use of PDF documents.
66.06	Research and discuss security issues related to PDF document usage in a web site (viruses, auto-open).
66.07	Identify accessibility issues related to using PDF documents in a web site.
67.0	Create, format, and manipulate PDF documents. – The student will be able to:
67.01	List and describe the methods available for creating PDF documents.
67.02	Create a PDF using a variety of software applications, multiple files, and web pages.
67.03	Demonstrate ability to format, modify and enhance a PDF document.
67.04	Describe the differences in PDF standards for document prepress data interchange and long-term archiving.
67.05	Embed images, text, audio, video, and Flash content into a PDF document.
67.06	Create and modify automatically generated and manual bookmarks in a PDF document.
67.07	Add clickable links to a PDF document.
67.08	Incorporate Find and Search methods to locate specific text in a PDF document.

	67.09 Describe the method used to search scanned documents (optical character recognition).
	67.10 Understand and correct color separation issues.
	67.11 Create and modify PDF documents using available tools to meet accessibility requirements (e.g., tags, reading order, forms, supplemental content for multimedia, text-to-speech).
	67.12 Export a PDF document in a different format.
68.0	Display, distribution, and print considerations for PDF documents. – The student will be able to:
	68.01 Define file specifications use to generate smaller files for electronic distribution and on-screen display.
	68.02 Specify image downsampling and compression settings to generate a PDF file with a smaller file size.
	68.03 Identify and correct potential printing issues in a PDF document.
	68.04 Ensure a PDF document meets appropriate criteria for print or electronic distribution.
	68.05 Demonstrate ability to control flattening of a transparent PDF document and misregistration.
	68.06 Demonstrate color management techniques that affect on-screen display and printing.
	68.07 Discuss methods and tools used to review a PDF document (email, shared, tracking).
69.0	Create and manage PDF forms. – The student will be able to:
	69.01 Create an interactive from using fields, form objects, and distribution methods.
	69.02 Distribute a form electronically and manage distributed forms.
	69.03 Demonstrate ability to redact content in a form to protect sensitive information.
	69.04 Preview, test, and modify an interactive form.
70.0	Incorporate PDF security in a PDF document. – The student will be able to:
	70.01 Secure a PDF document using passwords, encryption, digital IDs and signatures.
	70.02 Creating Security Policies and Certificates for a PDF document.
	70.03 Enable usage rights for Adobe Readers.
71.0	Demonstrate proficiency using HTML5 features and functions. – The student will be able to:
	71.01 Apply HTML5 APIs in web pages for interactivity (e.g., audio/video, drag & drop, drawing canvas).
	71.02 Apply HTML5 interactivity elements into web pages (i.e., <canvas>, <embed>, <audio>, <video>, <details> <input>).

71.03	Utilize HTML5 fallback strategies to address browser support issues.
71.04	Utilize HTML5 to define dynamic behaviors using JavaScript.
71.05	Use HTML5 specification to manipulate text & images.
71.06	Use HTML5 to create persistent data and single session storage (HTML 5 Local Offline Storage & Session Storage).
71.07	Use HTML5 for media event handling (audio, video, embed, image).
71.08	Use HTML5 event handling for window, mouse, and form events.
71.09	Use CSS3 to style HTML5 (e.g., transitions, typography enhancements).

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Java Development & Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y700200
CIP Number	0511020313
Grade Level	30, 31
Standard Length	1200 hours
Teacher Certification	BUS ED 1 @2 COMP SCI 6 COMP PROG 7G
CTSO	Phi Beta Lambda BPA SkillsUSA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the fundamentals of programming and software development; procedural and object-oriented programming; creating regular and specialized applications using the Java programming language, including testing, monitoring, debugging, documenting, and maintaining Java computer applications.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points, with OCPs A, B, and C.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	CTS0041	Computer Programmer Assistant	300 hours	15-1131
C	CTS0044	Computer Programmer	150 hours	15-1131
D	CTS0031	Java Developer	600 hours	15-1131

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
16.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
17.0 Distinguish between iterative and non-iterative program control structures.
18.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
19.0 Describe the processes, methods, and conventions for software development and maintenance.
20.0 Explain the types, uses, and limitations of testing for ensuring quality control.
21.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
22.0 Describe information security risks, threats, and strategies associated with software development.
23.0 Design a computer program to meet specific physical, operational, and interaction criteria.
24.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
25.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
26.0 Create a unit test plan, implement the plan, and report the results of testing.
27.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
28.0 Solve problems using critical thinking skills, creativity and innovation.
29.0 Use information technology tools.
30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
31.0 Describe the importance of professional ethics and legal responsibilities.

32.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
33.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
34.0 Design, document, and create object-oriented computer programs.
35.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
36.0 Construct statements that declare, initialize, and modify different types of variables used in Java programs.
37.0 Describe the types and characteristics of lexical units in the Java programming language.
38.0 Describe the data types employed in Java programs.
39.0 Construct Java statements that employ the use of various operators.
40.0 Write executable statements using Java.
41.0 Describe variable scope and its implications in Java programming.
42.0 Apply common Java programming style guidelines and conventions.
43.0 Demonstrate use of the compiler and interpreter through command line interface.
44.0 Construct conditional control statements in Java.
45.0 Construct iterative control statements in Java.
46.0 Use nested loop iterative control statements in Java.
47.0 Produce input and output for Java programs.
48.0 Use packages and import statements in a Java program.
49.0 Create a Java program that uses methods.
50.0 Create a Java program that uses parameters in methods.
51.0 Describe and use recursion in a Java program.
52.0 Construct Java statements that use the String class to manipulate String data.
53.0 Construct Java statements that use Classes.
54.0 Manage class relationships.
55.0 Construct Java statements that illustrate the use of multiplicities in class relationships.
56.0 Use object references.
57.0 Describe the types of arrays and construct Java statements that illustrate the use and manipulation of multi-dimensional and jagged arrays.
58.0 Construct Java statements that illustrate different ways of using inheritance.
59.0 Construct Java statements that use collections.
60.0 Write Java code that uses the Iterator and List interfaces.
61.0 Create Java code that includes exception handling code.
62.0 Create Java code that uses the Object class.
63.0 Use standard library classes that comprise the Java API.
64.0 Create Java code that uses exceptions to improve program quality.
65.0 Describe Java 2 Micro Edition (J2ME) uses, characteristics, and constraints.
66.0 Create and convert classes using Unified Modeling Language (UML).
67.0 Create programs that use of Remote Method Invocation (RMI) and other server technologies associated with Relational Database Management Systems (RDMS) and Structured Query Language (SQL).
68.0 Demonstrate an understanding of Java Integration APIs, including Java Message Service (JMS), Enterprise JavaBeans (EJB), and Java Naming and Directory Interface (JNDI).
69.0 Demonstrate an understanding of Java Client APIs, including the Abstract Window Toolkit (AWT), Swing, and Java applet.
70.0 Understand and apply Java 2 Enterprise Edition (J2EE) Server Solutions.
71.0 Create a database application using the Java programming language.

72.0 Create a graphical user interface application using the Java programming language.
73.0 Create a web-based application using the Java programming language.
74.0 Write code to perform common and union database queries using SQL and Java.
75.0 Implement Java program statements using objects.
76.0 Utilize debugging tools and write error handlers.
77.0 Demonstrate file I/O.
78.0 Utilize API functions.
79.0 Test and debug databases.
80.0 Successfully work as a member of a software development team.
81.0 Manage time according to a plan.
82.0 Keep acceptable records of progress, problems and solutions.
83.0 Plan, organize and carry out a project plan.
84.0 Manage resources.
85.0 Use tools, materials, and processes in an appropriate and safe manner.
86.0 Demonstrate an understanding of the software development process.
87.0 Research content related to the project and document the results.
88.0 Use presentation skills, and appropriate media to describe the progress, results and outcome of the experience.
89.0 Demonstrate competency in the area of expertise related to developing computer software using the Java programming language.

Florida Department of Education
Student Performance Standards

Program Title: Java Development and Programming
PSAV Number: Y700200

Course Number: OTA0040
Occupational Completion Point: A
Information Technology Assistant – 150 Hours – SOC Code 15-1151

Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
15.0	Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:
	15.01 Describe the evolution of programming and programming careers.
	15.02 Identify tasks performed by programmers.
	15.03 Describe how businesses use computer programming to solve business problems.
	15.04 Investigate job opportunities in the programming field.
	15.05 Explain different specializations and the related training in the computer programming field.
	15.06 Explain the need for continuing education and training of computer programmers.
	15.07 Explain enterprise software systems and how they impact business.
	15.08 Describe ethical responsibilities of computer programmers.
	15.09 Describe the role of customer support to software program quality.
	15.10 Identify credentials and certifications that may improve employability for a computer programmer.
	15.11 Identify devices, tools, and other environments for which programmers may develop software.
16.0	Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:
	16.01 Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.
	16.02 Explain the types and uses of variables in programs.
	16.03 Determine the best data type to use for given programming problems.
	16.04 Identify the types of operations that can be performed on different data types.
	16.05 Evaluate arithmetic and logical expressions using appropriate operator precedence.
	16.06 Explain how computers store different data types in memory.
	16.07 Demonstrate the difference between "data" and "information".
	16.08 Use different number systems to represent data.
	16.09 Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.

	16.10 Use Boolean logic to perform logical operations.
17.0	Distinguish between iterative and non-iterative program control structures. – The student will be able to:
	17.01 Explain non-iterative programming structures (e.g., if, if/else) and their uses.
	17.02 Explain iterative programming structures (e.g., while, do/while) and their uses.
18.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:
	18.01 Identify the characteristics, uses, and limits of low-level programming languages.
	18.02 Identify the characteristics, uses, and limits of high-level programming languages.
	18.03 Identify the characteristics, uses, and limits of rapid development programming languages.
	18.04 Describe object-oriented concepts.
	18.05 Explain the characteristics of procedural and object-oriented programming languages.
	18.06 Compare and contrast programming languages that are compiled (e.g., C++), interpreted (e.g., Basic, HTML), and translated (e.g., Java).
19.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:
	19.01 Describe and explain tools used in software development.
	19.02 Describe the stages of the program life cycle.
	19.03 Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).
	19.04 List and explain the steps in the program development cycle.
	19.05 Describe different types of documentation used in the program development cycle (e.g., requirements document, program design documents, test plans).
	19.06 Describe the on-going need for program maintenance.
	19.07 Describe different methods companies use to facilitate program updates for enhancements and defects (e.g., how customers receive patches, updates, new versions, upgrades).
	19.08 Describe different methods used to facilitate version control and change management.
20.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:
	20.01 Explain the uses and limits of testing in ensuring program quality.
	20.02 Explain testing performed at different stages of the program development cycle (e.g. unit testing, system testing, user acceptance testing).

	20.03 Describe data and the use of test plans/scripts to be used in program testing.
	20.04 Describe and identify types of programming errors (e.g., syntactical, logic, usability, requirements mismatch).
	20.05 Identify the data to be used for boundary conditions.
	20.06 Explain different types of testing (e.g., usability, automated, regression) and testing tools.
21.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:
	21.01 Describe different design methodologies and their uses (e.g., object-oriented design, structured design, and rapid application development).
	21.02 Describe tools for developing a program design (e.g., UML, flowcharts, design documents, pseudocode).
	21.03 Explain the role of existing libraries and packages in facilitating programmer productivity.
	21.04 Participate and contribute to a design review of a program design developed using a common program design tool (e.g., UML, flowcharts, design documents, pseudocode).
	21.05 Write a program design document using UML or other standard design methodology.
	21.06 Define input and output for a program module using UML or other standard design methodology.
22.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:
	22.01 Explain the security risks to personal and business computer users.
	22.02 Identify different types of threats to computer systems.
	22.03 Identify methods to protect against different threats to computer systems.
	22.04 Understand the importance of a disaster / emergency response plan.
	22.05 Identify alternative methods for data storage and backup (e.g., mirroring, fail-over, high availability, types of backups).
23.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:
	23.01 Choose appropriate data types depending on the needs of the program.
	23.02 Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).
	23.03 Design and develop program that are designed for efficiency (e.g., less memory usage, less inputs/outputs, faster processing).
	23.04 Identify the software environment required for a program to run (e.g., operating system required, mobile, Web-based, desktop, delivery method).

	23.05 Identify the tools required to develop a program (e.g., editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).
24.0	Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:
	24.01 Use appropriate naming conventions to define program variables and modules (methods, functions).
	24.02 Use a program editor to write the source code for a program.
	24.03 Write programs that use selection structures (e.g., if, if/else).
	24.04 Write programs that use repetition structures (e.g., while, do/while).
	24.05 Write programs that use nested structures.
	24.06 Use internal documentation (e.g., single-line and multi-line comments, program headers, module descriptions, and meaningful variable and function/module names) to document a program according to accepted standards.
	24.07 Compile and run programs.
	24.08 Write programs that use standard arithmetic operators with different numerical data types.
	24.09 Write programs that use standard logic operators.
	24.10 Write programs that use a variety of common data types.
	24.11 Write programs that perform data conversion between standard data types.
	24.12 Write programs that define, use, search, and sort arrays.
	24.13 Write programs that use user-defined data types.
	24.14 Demonstrate understanding and use of appropriate variable scope.
25.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:
	25.01 Write programs that perform user input and output.
	25.02 Write programs that validate user input (e.g., range checking, data formats, valid/invalid characters).
	25.03 Write program modules such as functions, subroutines, or methods.
	25.04 Write program modules that accept arguments.
	25.05 Write program modules that return values.
	25.06 Write program modules that validate arguments and return error codes.

	25.07 Write interactive programs.
	25.08 Write programs that use standard libraries to enhance program function.
	25.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
26.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	26.01 Write a unit test plan that identifies the input data and expected results for program tests.
	26.02 Test and debug programs, including programs written by others.
	26.03 Write a test report that identifies the results of testing.
	26.04 Trace through the function of a program to ensure valid operation.
	26.05 Identify the system resources used by the program (e.g., memory, disk space, execution time, external devices).
	26.06 Create a disaster / emergency response plan for a computer system.
27.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	27.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	27.02 Locate, organize and reference written information from various sources.
	27.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	27.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	27.05 Apply active listening skills to obtain and clarify information.
	27.06 Develop and interpret tables and charts to support written and oral communications.
	27.07 Exhibit public relations skills that aid in achieving customer satisfaction.
28.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	28.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	28.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	28.03 Identify and document workplace performance goals and monitor progress toward those goals.
	28.04 Conduct technical research to gather information necessary for decision-making.
29.0	Use information technology tools. – The student will be able to:
	29.01 Use personal information management (PIM) applications to increase workplace efficiency.

29.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
29.03	Employ computer operations applications to access, create, manage, integrate, and store information.
29.04	Employ collaborative/groupware applications to facilitate group work.
30.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
30.01	Employ leadership skills to accomplish organizational goals and objectives.
30.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
30.03	Conduct and participate in meetings to accomplish work tasks.
31.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
31.01	Evaluate and justify decisions based on ethical reasoning.
31.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
31.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.

Course Number: CTS0044 **Occupational Completion Point: C** **Computer Programmer – 150 Hours – SOC Code 15-1131**	
32.0	Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:
32.01	Demonstrate the understanding and use of classes, objects, attributes, and behaviors.
32.02	Demonstrate the understanding and use of inheritance.
32.03	Demonstrate the understanding and use of data encapsulation.
32.04	Demonstrate the understanding and use of polymorphism.
33.0	Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements. – The student will be able to:
33.01	Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.
33.02	Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.
33.03	Design an object-oriented program using UML or another standard design methodology.
33.04	Work with other team members to develop a project plan for a program.
33.05	Work with other team members to write a design document for a program with multiple functions and shared data.
33.06	Participate in design meetings that review program design documents for conformance to program requirements.
33.07	Estimate the time to develop a program or module.
34.0	Design, document, and create object-oriented computer programs. – The student will be able to:
34.01	Compare and contrast recursive functions to other iterative methods.
34.02	Understand the implementation of character strings in the programming language.
34.03	Write programs that perform string processing (e.g., string manipulation, string compares, concatenation).
34.04	Write programs that use user-defined data types.
34.05	Write object-oriented programs that use inheritance.
34.06	Write object-oriented programs that use polymorphism.
34.07	Develop class constructors.
34.08	Write programs that define and use program constants.

	34.09	Write programs that perform error handling.
	34.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.
	34.11	Write programs that perform dynamic memory allocation.
	34.12	Write programs that perform effective management of dynamically allocated memory.
	34.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal and external) related to version control.
	34.14	Write programs that use complex data structures (e.g., stacks, queues, trees, linked lists).
	34.15	Write programs that are event-driven.
	34.16	Write programs that perform file input and output (i.e., sequential, random access file input/output).
	34.17	Perform basic database commands including connect, open, select, and close.
35.0	Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results. – The student will be able to:	
	35.01	Develop a test plan for an object-oriented program.
	35.02	Write test plans for event-driven programs.
	35.03	Write test plans for programs that perform file input and output.
	35.04	Perform test and debug activities on object-oriented programs, including those written by someone else.
	35.05	Perform test and debug activities on an event-driven program.
	35.06	Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.
	35.07	Document the findings of testing in a test report.

Course Number: CTS0031 **Occupational Completion Point: D** **Java Developer – 600 Hours – SOC Code 15-1131**	
36.0	Construct statements that declare, initialize, and modify different types of variables used in Java programs. – The student will be able to:
36.01	Describe how variables are used in programs.
36.02	Identify the eight Java primitive data types.
36.03	Identify the minimum and maximum ranges of primitive data types.
36.04	Identify which data type should be used for a given situation.
36.05	Identify the syntax for using variables.
36.06	Declare and initialize variables.
36.07	Assign new values to variables.
36.08	Create and use constant variables.
37.0	Describe the types and characteristics of lexical units in the Java programming language. – The student will be able to:
37.01	Describe the types of lexical units.
37.02	Describe identifiers and identify valid and invalid identifiers.
37.03	Describe and identify reserved words, delimiters, literals, and comments.
38.0	Describe the data types employed in Java programs. – The student will be able to:
38.01	Describe the data type categories.
38.02	Give examples of primitives, reference data types.
38.03	Identify and use enumerations.
38.04	Understand the use of Wrapper Classes in programs.
38.05	Describe the difference between real and integer data types.
39.0	Construct Java statements that employ the use of various operators. – The student will be able to:
39.01	Construct statements using arithmetic operators.
39.02	Construct statements using relational operators.

	39.03 Construct and use statements using logical operators.
	39.04 Construct and use statements using assignment operators.
	39.05 Construct and execute statements using operator precedence.
40.0	Write executable statements using Java. – The student will be able to:
	40.01 Construct variable assignment statements.
	40.02 Construct statements using built-in Math functions.
	40.03 Differentiate between implicit and explicit data type conversions.
	40.04 Describe when implicit data type conversions take place.
	40.05 List the drawbacks of implicit data type conversions.
	40.06 Describe the process of autoboxing and promotion.
	40.07 Construct statements using functions to explicitly convert data types.
41.0	Describe variable scope and its implications in Java programming. – The student will be able to:
	41.01 Understand the scope and visibility of variables.
	41.02 Write programs using local variables.
	41.03 Describe the scope of a variable.
	41.04 Describe the default value of local, instance, and static scope of variables.
	41.05 Describe how compiler uses scope to identify variables with the same name.
42.0	Apply common Java programming style guidelines and conventions. – The student will be able to:
	42.01 List examples of good programming practices.
	42.02 Insert comments into code.
	42.03 Follow formatting guidelines when writing code.
	42.04 Understand the different types of errors produced by programs.
43.0	Demonstrate use of the compiler and interpreter through command line interface. – The student will be able to:
	43.01 Describe the use of the Java compiler (javac) and Java interpreter (Java VM).
	43.02 Demonstrate the use of the - classpath flag and –d flag to the compiler.

	43.03 Identify the environmental variables of PATH and CLASSPATH.
	43.04 Describe the process of command line arguments to the program.
	43.05 Create programs that take in multiple command line arguments.
44.0	Construct conditional control statements in Java. – The student will be able to:
	44.01 Construct and use an if statement.
	44.02 Construct and use a switch statement.
	44.03 Construct and use a while, do while, and for loop.
	44.04 Construct and use a conditional operator.
45.0	Construct iterative control statements in Java. – The student will be able to:
	45.01 Describe the types of loop statements and their uses.
	45.02 Construct and use the while and do while loop.
	45.03 Construct and use the for loop.
	45.04 Construct and use the enhanced for loop.
	45.05 Describe when a while loop is used.
	45.06 Describe when a for loop is used.
46.0	Use nested loop iterative control statements in Java. – The student will be able to:
	46.01 Construct and execute a program using nested loops.
	46.02 Construct and execute a loop using break and continue.
	46.03 Evaluate a nested loop construct and sentinel value.
47.0	Produce input and output for Java programs. – The student will be able to:
	47.01 Describe and use classes (e.g., Scanner, System) to input data into programs.
	47.02 Demonstrate the use of different ways to input data into programs using Scanner or System class.
	47.03 Describe and demonstrate the use of the System class to produce output to the console.
	47.04 Explain the difference between print and println functions in the System class.
	47.05 Create and use escape sequences.

48.0	Use packages and import statements in a Java program. – The student will be able to:
	48.01 Describe the use of import statements.
	48.02 Describe the use of packages.
	48.03 Create code that uses package statements to avoid class conflict.
	48.04 Create packages that abide by standard Java naming convention.
	48.05 Demonstrate the use of Java-API to search for classes and packages.
49.0	Create a Java program that uses methods. – The student will be able to:
	49.01 Differentiate between anonymous blocks and methods.
	49.02 Identify the benefits of using methods.
	49.03 Describe a method signature.
	49.04 Create a method.
	49.05 Describe how a method is invoked.
	49.06 Describe the purpose of overloading methods.
	49.07 Create overloaded methods in programs.
50.0	Create a Java program that uses parameters in methods. – The student will be able to:
	50.01 Describe how parameters are passed into functions.
	50.02 Define a parameter.
	50.03 Create a method using a parameter.
	50.04 Invoke a method that has parameters.
	50.05 Distinguish between formal and actual parameters.
	50.06 Demonstrate the use of reference parameters in methods.
51.0	Describe and use recursion in a Java program. – The student will be able to:
	51.01 Describe the use of recursion in solving problems.
	51.02 Describe the difference of iterative and recursive methods.

	51.03 Demonstrate the use of direct recursion.
	51.04 Demonstrate the use of indirect recursion.
52.0	Construct Java statements that use the String class to manipulate String data. – The student will be able to:
	52.01 Explain the use of the String class.
	52.02 Create code to concatenate strings using the concatenation operator.
	52.03 Demonstrate how to search a string using indexOf method of the String class.
	52.04 Explain the effect of immutability of Strings.
	52.05 Create Strings using string literals, and through new keyword.
	52.06 Demonstrate the use of the following string manipulation methods of the String class: charAt,length, trim, substring, replace, startsWidth and endsWith.
53.0	Construct Java statements that use Classes. – The student will be able to:
	53.01 Describe and identify abstract data types.
	53.02 Describe the difference between an object and a class.
	53.03 Identify class attributes.
	53.04 Create instance variables for a class.
	53.05 Use visibility modifiers for attributes.
	53.06 Identify constructors and describe their use.
	53.07 Describe encapsulation.
	53.08 Write class using encapsulation.
	53.09 Apply data abstraction through the use of accessor or and mutator methods.
	53.10 Describe the equals method.
	53.11 Demonstrate the use of classes in methods as both parameters and return types.
	53.12 Describe the garbage collection process.
	53.13 Demonstrate reusability and extensibility in class creation.
	53.14 Demonstrate the use of Comparable interface to compare objects.

54.0	Manage class relationships. – The student will be able to:
	54.01 Explain the association relationship among classes.
	54.02 Explain the direct association relationship among classes.
	54.03 Explain the composition and aggregation relationship among classes.
	54.04 Explain the direct association relationship among classes.
	54.05 Write programs that use composition, association.
	54.06 Write programs that use direct association.
55.0	Construct Java statements that illustrate the use of multiplicities in class relationships. – The student will be able to:
	55.01 Describe how multiplicities affect class relationships.
	55.02 Describe one-to one, one-to-many, and many-to-many relationships.
	55.03 Write programs that use multiplicities in class relationships.
56.0	Use object references. – The student will be able to:
	56.01 Identify reference aliases.
	56.02 Understand and use null reference.
	56.03 Explain the this reference and its use in class creation.
57.0	Describe the types of arrays and construct Java statements that illustrate the use and manipulation of multi-dimensional and jagged arrays. – The student will be able to:
	57.01 Declare and initialize and array.
	57.02 Demonstrate the use of initializer lists.
	57.03 Demonstrate the use of arrays in methods.
	57.04 Demonstrate the updating, populating and destroying arrays.
	57.05 Explain linear and binary searching.
	57.06 Sort arrays using selection sort, insertion sort, and bubble sort.
	57.07 Demonstrate the use of multidimensional arrays.
	57.08 Demonstrate the use of jagged arrays.
	57.09 Demonstrate basic hashing using arrays.

58.0	Construct Java statements that illustrate different ways of using inheritance. – The student will be able to:
	58.01 Explain the purpose and use of inheritance in object oriented programming.
	58.02 Explain the difference between single and multiple inheritance.
	58.03 Create parent and child classes.
	58.04 Create overloaded methods.
	58.05 Describe the has-a and is-a relationship.
	58.06 Create class hierarchies.
	58.07 Explain the process of generalization to specification.
	58.08 Demonstrate the use of abstract classes.
	58.09 Explain polymorphism.
	58.10 Create a program that uses polymorphism.
	58.11 Demonstrate the use of the instanceof method.
59.0	Construct Java statements that use collections. – The student will be able to:
	59.01 Describe data structure of linked lists.
	59.02 Create a linked list manually.
	59.03 Use the ArrayList class.
	59.04 Create a stack and Queue manually.
	59.05 Use the Stack and Queue standard class.
	59.06 Identify which data structure is best fitted for a situation.
	59.07 Use iterators with collections.
	59.08 Identify how to insert, delete, update, and traverse data structures.
60.0	Write Java code that uses the Iterator and List interfaces. – The student will be able to:
	60.01 Describe the purpose of interfaces.
	60.02 Create and use interfaces in programs.

	60.03 Use the Comparable interface.
	60.04 Use the Iterator interface and List Interface in programs.
	60.05 Understand the program to the interface principle.
61.0	Create Java code that includes exception handling code. – The student will be able to:
	61.01 Describe the advantages of including exception handling code.
	61.02 Describe the purpose of an EXCEPTION section in a program block.
	61.03 Create code to include an EXCEPTION section.
	61.04 List the guidelines for exception handling.
62.0	Create Java code that uses the Object class. – The student will be able to:
	62.01 Understand the Object class relationship to other classes.
	62.02 Demonstrate the use of toString method.
	62.03 Demonstrate the use of clone and finalize methods.
	62.04 Write program to use Object class functionality.
63.0	Use standard library classes that comprise the Java API. – The student will be able to:
	63.01 Describe the classes and methods in the basic input/output package.
	63.02 Describe the classes and methods in the utilities package.
	63.03 Describe the classes and methods in the utilities package.
	63.04 Describe the classes and methods in the networking package.
	63.05 Describe the classes and methods in the AWT and swing package.
	63.06 Describe the classes and methods in the SQL and SQLX package.
64.0	Create Java code that uses exceptions to improve program quality. – The student will be able to:
	64.01 Explain how exception handling works in Java.
	64.02 Trap exceptions using try and catch.
	64.03 Explain when to use the finally clause.

	64.04 Demonstrate handling exceptions through throwing and catching.
	64.05 Create and Exception and manage the exception.
	64.06 Explain the use of inheritance and exceptions.
65.0	Describe Java 2 Micro Edition (J2ME) uses, characteristics, and constraints. – The student will be able to:
	65.01 Understand midlets.
	65.02 Explain CLDC and profiles.
	65.03 Explain the constraints specific to J2ME programming when compared to J2SE.
	65.04 Understand the high architectural goal of J2ME.
	65.05 Create user-defined functions.
66.0	Create and convert classes using Unified Modeling Language (UML). – The student will be able to:
	66.01 Identify UML elements Classes, abstract Classes, Interfaces.
	66.02 Identify UML attributes, operators, visibility modifiers and UML associations.
	66.03 Given a set of classes be able to convert the classes to a UML diagram.
	66.04 Given a UML diagram be able to create classes.
67.0	Create programs that use of Remote Method Invocation (RMI) and other server technologies associated with Relational Database Management Systems (RDMS) and Structured Query Language (SQL). – The student will be able to:
	67.01 Understand and describe RMI.
	67.02 Write a program to use RMI.
	67.03 Understand RDMS and SQL technologies.
	67.04 Use the Java Database Connectivity API to connect and execute SQL statements to RDMS.
68.0	Demonstrate an understanding of Java Integration APIs, including Java Message Service (JMS), Enterprise JavaBeans (EJB), and Java Naming and Directory Interface (JNDI). – The student will be able to:
	68.01 Understand and describe JMS.
	68.02 Understand and describe EJB technology.
	68.03 Understand and describe JNDI technology.

69.0	Demonstrate an understanding of Java Client APIs, including the Abstract Window Toolkit (AWT), Swing, and Java applet. – The student will be able to:
	69.01 Understand and describe AWT and GUI interface.
	69.02 Understand and describe the use of Swing components and GUI.
	69.03 Understand and describe the use of applet technology.
70.0	Understand and apply Java 2 Enterprise Edition (J2EE) Server Solutions. – The student will be able to:
	70.01 Understand java Web Services.
	70.02 Underrated and use SMTP and Java Mail technologies.
	70.03 Understand how to use JSP and Servlets.
71.0	Create a database application using the Java programming language. – The student will be able to:
	71.01 Utilize loop statements.
	71.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
	71.03 Create user-defined functions.
	71.04 Utilize common built-in functions.
	71.05 Declare variables in modules and procedures.
	71.06 Declare arrays, and initialize elements of arrays.
	71.07 Declare and use object variables and collections, and use their associated properties and methods.
	71.08 Declare symbolic constants, and make them available locally or publicly.
	71.09 Respond to events.
72.0	Create a graphical user interface application using the Java programming language. – The student will be able to:
	72.01 Utilize loop statements.
	72.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
	72.03 Create user-defined functions.
	72.04 Utilize common built-in functions.
	72.05 Declare variables in modules and procedures.

	72.06 Declare arrays, and initialize elements of arrays.
	72.07 Declare and use object variables and collections, and use their associated properties and methods.
	72.08 Declare symbolic constants, and make them available locally or publicly.
	72.09 Use the Java Event model to handle user inputs from events.
	72.10 Use JComponents and layout managers to create the GUI.
73.0	Create a web-based application using the Java programming language. – The student will be able to:
	73.01 Utilize loop statements.
	73.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
	73.03 Create user-defined functions.
	73.04 Utilize common built-in functions.
	73.05 Declare variables in modules and procedures.
	73.06 Declare arrays, and initialize elements of arrays.
	73.07 Declare and use object variables and collections, and use their associated properties and methods.
	73.08 Declare symbolic constants, and make them available locally or publicly.
	73.09 Write JSP pages to process user input.
	73.10 Write Servlets to provide input and output processing for the web solution.
74.0	Write code to perform common and union database queries using SQL and Java. – The student will be able to:
	74.01 Utilize SQL to write common queries.
	74.02 Refer to objects by using SQL.
	74.03 Utilize union queries.
75.0	Implement Java program statements using objects. – The student will be able to:
	75.01 Determine when to use data access objects.
	75.02 Differentiate between objects and collections.

	75.03 Write statements that access and modify database objects, EJB objects.
	75.04 Select appropriate methods and property settings for use with specified objects.
76.0	Utilize debugging tools and write error handlers. – The student will be able to:
	76.01 Trap errors.
	76.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.
	76.03 Debug code samples.
	76.04 Utilize the Debugger to monitor variable values.
	76.05 Write an error handler.
77.0	Demonstrate file input/output (I/O). – The student will be able to:
	77.01 Read from sequential and random access files.
	77.02 Write to sequential and random access files.
	77.03 Use file serialization.
78.0	Utilize API functions. – The student will be able to:
	78.01 Properly declare functions.
	78.02 Use the by value and by reference parameters.
79.0	Test and debug databases. – The student will be able to:
	79.01 Implement error handling.
	79.02 Test and debug library databases.
80.0	Successfully work as a member of a software development team. – The student will be able to:
	80.01 Accept responsibility for specific tasks in a given situation.
	80.02 Document progress, and provide feedback on work accomplished in a timely manner.
	80.03 Complete assigned tasks in a timely and professional manner.
	80.04 Reassign responsibilities when the need arises.
	80.05 Complete daily tasks as assigned on one’s own initiative.

81.0	Manage time according to a plan. – The student will be able to:
	81.01 Set realistic time frames and schedules.
	81.02 Keep a written time sheet of work accomplished on a daily basis.
	81.03 Meet goals and objectives set by the team.
	81.04 Identify individual priorities.
	81.05 Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities as needed.
82.0	Keep acceptable records of progress problems and solutions. – The student will be able to:
	82.01 Develop a record keeping system in the form of a log book to record daily progress.
	82.02 Use a project journal to identify problem statement.
	82.03 Develop a portfolio of work accomplished to include design drawings, flowcharts, drawings and plans, and prototypes.
83.0	Plan, organize, and carry out a project plan. – The student will be able to:
	83.01 Determine the scope of a project.
	83.02 Organize the team according to individual strengths.
	83.03 Assign specific tasks within a team.
	83.04 Determine project priorities.
	83.05 Identify required resources.
	83.06 Plan research, design, development, and evaluation activities as required.
	83.07 Carry out the project plan to successful completion.
84.0	Manage resources. – The student will be able to:
	84.01 Identify required resources for each stage of the project plan.
	84.02 Determine the methods needed to acquire needed resources.
	84.03 Demonstrate good judgment in the use of resources.
	84.04 Recycle and reuse resources where appropriate.
	84.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.

85.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:
	85.01 Identify the proper tool for a given job.
	85.02 Use tools and machines in a safe manner.
	85.03 Adhere to laboratory or job site safety rules and procedures.
	85.04 Identify the application of processes appropriate to the task at hand.
	85.05 Identify materials appropriate to their application.
86.0	Demonstrate an understanding of the software development process. – The student will be able to:
	86.01 State the goals of the software application clearly.
	86.02 Identify and write a plan to achieve each goal.
	86.03 Develop a list of materials and content required for each goal.
	86.04 Develop a step by step procedure for developing the application.
	86.05 Follow a written procedure.
	86.06 Record data from evaluation activities.
	86.07 Document conclusions and solutions based on evaluation results, observations and data.
	86.08 Document progress using a project log.
	86.09 Write an abstract describing the project plan.
87.0	Research content related to the project and document the results following industry conventions. – The student will be able to:
	87.01 Identify the basic research needed to develop the project plan.
	87.02 Identify available resources for completing background research required in the project plan.
	87.03 Demonstrate the ability to locate resource materials in a library, data base, internet and other research resources.
	87.04 Demonstrate the ability to organize information retrieval.
	87.05 Demonstrate the ability to prepare a topic outline.
	87.06 Write a draft of the research report.
	87.07 Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.

	87.08 Prepare an electronically composed research paper in proper form.
	87.09 Conduct an alpha and beta evaluation of the project's product.
	87.10 Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.
88.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:
	88.01 Prepare a multi-media presentation on the completed project.
	88.02 Make an oral presentation, using multi-media materials.
	88.03 Review the presentation, and make changes in the delivery method(s) to improve presentation skills.
89.0	Demonstrate competency in the area of expertise related to developing computer software using the Java programming language. – The student will be able to:
	89.01 Demonstrate a mastery of the content of the selected subject area.
	89.02 Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.
	89.03 Demonstrate the ability to apply the knowledge, experience and skill developed in the previous program completion to the successful completion of this demonstration.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Database Application Development & Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y700300
CIP Number	0511020315
Grade Level	30, 31
Standard Length	1200 hours
Teacher Certification	BUS ED 1 @2 COMP SCI 6 COMP PROG 7 G
CTSO	Phi Beta Lambda BPA SkillsUSA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the fundamentals of programming and software development; procedural and object-oriented programming; creating regular and specialized applications using standard and extended Structured Query Language (SQL), including testing, monitoring, debugging, documenting, and maintaining database applications.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points, with OCPs A, B, and C..

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	CTS0041	Computer Programmer Assistant	300 hours	15-1131
C	CTS0044	Computer Programmer	150 hours	15-1131
D	CTS0062	Database Programmer	600 hours	15-1131

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
16.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
17.0 Distinguish between iterative and non-iterative program control structures.
18.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
19.0 Describe the processes, methods, and conventions for software development and maintenance.
20.0 Explain the types, uses, and limitations of testing for ensuring quality control.
21.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
22.0 Describe information security risks, threats, and strategies associated with software development.
23.0 Design a computer program to meet specific physical, operational, and interaction criteria.
24.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
25.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
26.0 Create a unit test plan, implement the plan, and report the results of testing.
27.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
28.0 Solve problems using critical thinking skills, creativity and innovation.
29.0 Use information technology tools.
30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
31.0 Describe the importance of professional ethics and legal responsibilities.

32.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
33.0 Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements.
34.0 Design, document, and create object-oriented computer programs.
35.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results
36.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
37.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
38.0 Develop the process of creating an entity by identifying relationships.
39.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
40.0 Consider the degree and optionality of relationships of entities.
41.0 Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams.
42.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
43.0 Demonstrate proficiency in designing and adding complexity to an entity-relationship model (ERM).
44.0 Apply complex ERM information by fine-tuning entities and the process for relating them.
45.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
46.0 Demonstrate proficiency in the technique of normalization by labeling and organizing all items in a database in such a way as to prevent any confusion or mistakes.
47.0 Demonstrate proficiency in table normalization by combining the techniques of an entity relationship model or a top-down, business approach to data with normalization or a bottom-up mathematical approach to data.
48.0 Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database.
49.0 Extend the logical model presentation model by normalizing the data and mapping the management system.
50.0 Apply techniques for building a storage management system by creating a website using templates and wizards.
51.0 Demonstrate design and functionality by constructing a group business presentation.
52.0 Demonstrate comprehension of database modeling competency through group presentation.
53.0 Demonstrate comprehension that the database management software is a system for organizing the storage unit (or database) according to business needs and rules, through data integrity constraints.
54.0 Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements.
55.0 Demonstrate proficiency working with columns, characters, and rows in SQL.
56.0 Demonstrate proficiency in using SQL comparison operators.
57.0 Demonstrate proficiency in using logical comparisons and precedence rules.
58.0 Demonstrate proficiency using SQL single row functions.
59.0 Demonstrate proficiency displaying data from multiple tables.
60.0 Demonstrate proficiency aggregating data using group functions.
61.0 Demonstrate proficiency utilizing subqueries.
62.0 Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language.
63.0 Demonstrate proficiency creating and managing database objects.
64.0 Demonstrate proficiency altering tables and constraints implementing views.
65.0 Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects.
66.0 Demonstrate ability to control user access and SQL language interface and reporting tool.
67.0 Demonstrate comprehension of bundling features of SQL.
68.0 Demonstrate comprehension working with composite data types by writing executable script files.

69.0 Describe the differences between SQL and SQL extension languages.
70.0 Create program blocks.
71.0 Use variables in program blocks.
72.0 Recognize lexical units.
73.0 Recognize data types.
74.0 Use scalar data types.
75.0 Use various types of joins.
76.0 Use SQL group functions and subqueries.
77.0 Write executable statements.
78.0 Use nested blocks and variable scope.
79.0 Use good programming practices.
80.0 Write DML statements to manipulate data.
81.0 Retrieve data.
82.0 Manipulate data.
83.0 Use transaction control statements
84.0 Use IF conditional control statements.
85.0 Use CASE conditional control statements.
86.0 Use basic LOOP iterative control statements.
87.0 Use WHILE and FOR loop iterative control statements.
88.0 Use nested loop iterative control statements.
89.0 Use explicit cursors.
90.0 Use explicit cursor attributes.
91.0 Use cursor FOR loops.
92.0 Use cursors with parameters.
93.0 Use cursors for update transactions.
94.0 Use multiple cursors.
95.0 Handle exceptions.
96.0 Trap server exceptions.
97.0 Trap user-defined exceptions.
98.0 Create procedures.
99.0 Use parameters in procedures.
100.0 Pass parameters.
101.0 Create stored functions.
102.0 Use functions in SQL statements.
103.0 Manage procedures and functions.
104.0 Manage object privileges.
105.0 Use invoker’s rights.
106.0 Create packages.
107.0 Manage package constructs.
108.0 Use advanced package concepts.
109.0 Manage persistent state of package variables.
110.0 Use vendor-supplied packages.

111.0 Understand dynamic SQL.
112.0 Understand triggers.
113.0 Create DML triggers.
114.0 Create DDL and database event triggers.
115.0 Manage triggers.
116.0 Use large object data types.
117.0 Manage binary types.
118.0 Manage indexes.
119.0 Manage dependencies.
120.0 Program a database application.
121.0 Utilize the basic concepts of database design.
122.0 Utilize SQL and union queries.
123.0 Implement program statements using objects.
124.0 Utilize debugging tools and write error handlers.
125.0 Demonstrate file I/O.
126.0 Create forms and identify all the properties of a form.
127.0 Manipulate data using object models
128.0 Develop custom controls.
129.0 Utilize API functions.
130.0 Demonstrate database replication and implement database replication using programming tools.
131.0 Analyze and implement security options.
132.0 Implement client/server applications.
133.0 Optimize the performance of a database.
134.0 Perform application distribution.
135.0 Test and debug databases.

Florida Department of Education
Student Performance Standards

Program Title: Database Application Development & Programming
PSAV Number: Y700300

Course Number: OTA0040 **Occupational Completion Point: A** **Information Technology Assistant – 150 Hours – SOC Code 15-1151**
Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
15.0	Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:
	15.01 Describe the evolution of programming and programming careers.
	15.02 Identify tasks performed by programmers.
	15.03 Describe how businesses use computer programming to solve business problems.
	15.04 Investigate job opportunities in the programming field.
	15.05 Explain different specializations and the related training in the computer programming field.
	15.06 Explain the need for continuing education and training of computer programmers.
	15.07 Explain enterprise software systems and how they impact business.
	15.08 Describe ethical responsibilities of computer programmers.
	15.09 Describe the role of customer support to software program quality.
	15.10 Identify credentials and certifications that may improve employability for a computer programmer.
	15.11 Identify devices, tools, and other environments for which programmers may develop software.
16.0	Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:
	16.01 Identify the characteristics (*e.g.*, size, limits) and uses of different numerical and non-numerical data types.
	16.02 Explain the types and uses of variables in programs.
	16.03 Determine the best data type to use for given programming problems.
	16.04 Identify the types of operations that can be performed on different data types.
	16.05 Evaluate arithmetic and logical expressions using appropriate operator precedence.
	16.06 Explain how computers store different data types in memory.
	16.07 Demonstrate the difference between "data" and "information."
	16.08 Use different number systems to represent data.
	16.09 Explain how national and international standards (*i.e.*, ASCII, UNICODE) are used to represent non-numerical data.
	16.10 Use Boolean logic to perform logical operations.

17.0	Distinguish between iterative and non-iterative program control structures. – The student will be able to:
17.01	Explain non-iterative programming structures (*e.g.*, if, if/else) and their uses.
17.02	Explain iterative programming structures (*e.g.*, while, do/while) and their uses.
18.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:
18.01	Identify the characteristics, uses, and limits of low-level programming languages.
18.02	Identify the characteristics, uses, and limits of high-level programming languages.
18.03	Identify the characteristics, uses, and limits of rapid development programming languages.
18.04	Describe object-oriented concepts.
18.05	Explain the characteristics of procedural and object-oriented programming languages.
18.06	Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).
19.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:
19.01	Describe and explain tools used in software development.
19.02	Describe the stages of the program life cycle.
19.03	Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).
19.04	List and explain the steps in the program development cycle.
19.05	Describe different types of documentation used in the program development cycle (*e.g.*, requirements document, program design documents, test plans).
19.06	Describe the on-going need for program maintenance.
19.07	Describe different methods companies use to facilitate program updates for enhancements and defects (*e.g.*, how customers receive patches, updates, new versions, upgrades).
19.08	Describe different methods used to facilitate version control and change management.
20.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:
20.01	Explain the uses and limits of testing in ensuring program quality.
20.02	Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).
20.03	Describe data and the use of test plans/scripts to be used in program testing.

20.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).
20.05	Identify the data to be used for boundary conditions.
20.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.
21.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:
21.01	Describe different design methodologies and their uses (*e.g.*, object-oriented design, structured design, rapid application development).
21.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).
21.03	Explain the role of existing libraries and packages in facilitating programmer productivity.
21.04	Participate and contribute to a design review of a program design developed using a common program design tool (*e.g.*, UML, flowcharts, design documents, pseudocode).
21.05	Write a program design document using UML or other standard design methodology.
21.06	Define input and output for a program module using UML or other standard design methodology.
22.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:
22.01	Explain the security risks to personal and business computer users.
22.02	Identify different types of threats to computer systems.
22.03	Identify methods to protect against different threats to computer systems.
22.04	Understand the importance of a disaster/emergency response plan.
22.05	Identify alternative methods for data storage and backup (*e.g.*, mirroring, fail-over, high availability, types of backups).
23.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:
23.01	Choose appropriate data types depending on the needs of the program.
23.02	Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).
23.03	Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).
23.04	Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).
23.05	Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).

24.0	Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:
24.01	Use appropriate naming conventions to define program variables and modules (methods, functions).
24.02	Use a program editor to write the source code for a program.
24.03	Write programs that use selection structures (*e.g.*, if, if/else).
24.04	Write programs that use repetition structures (*e.g.*, while, do/while).
24.05	Write programs that use nested structures.
24.06	Use internal documentation (*e.g.*, single-line and multi-line comments, program headers, module descriptions, and meaningful variable, function/module names) to document a program according to accepted standards.
24.07	Compile and run programs.
24.08	Write programs that use standard arithmetic operators with different numerical data types.
24.09	Write programs that use standard logic operators.
24.10	Write programs that use a variety of common data types.
24.11	Write programs that perform data conversion between standard data types.
24.12	Write programs that define, use, search, and sort arrays.
24.13	Write programs that use user-defined data types.
24.14	Demonstrate understanding and use of appropriate variable scope.
25.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:
25.01	Write programs that perform user input and output.
25.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).
25.03	Write program modules such as functions, subroutines, or methods.
25.04	Write program modules that accept arguments.
25.05	Write program modules that return values.
25.06	Write program modules that validate arguments and return error codes.
25.07	Write interactive programs.

	25.08 Write programs that use standard libraries to enhance program function.
	25.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
26.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	26.01 Write a unit test plan that identifies the input data and expected results for program tests.
	26.02 Test and debug programs, including programs written by others.
	26.03 Write a test report that identifies the results of testing.
	26.04 Trace through the function of a program to ensure valid operation.
	26.05 Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).
	26.06 Create a disaster/emergency response plan for a computer system.
27.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	27.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	27.02 Locate, organize and reference written information from various sources.
	27.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	27.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	27.05 Apply active listening skills to obtain and clarify information.
	27.06 Develop and interpret tables and charts to support written and oral communications.
	27.07 Exhibit public relations skills that aid in achieving customer satisfaction.
28.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	28.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	28.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	28.03 Identify and document workplace performance goals and monitor progress toward those goals.
	28.04 Conduct technical research to gather information necessary for decision-making.
29.0	Use information technology tools. – The student will be able to:
	29.01 Use personal information management (PIM) applications to increase workplace efficiency.
	29.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.

	29.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	29.04 Employ collaborative/groupware applications to facilitate group work.
30.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	30.01 Employ leadership skills to accomplish organizational goals and objectives.
	30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	30.03 Conduct and participate in meetings to accomplish work tasks.
31.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	31.01 Evaluate and justify decisions based on ethical reasoning.
	31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.

Course Number: CTS0044 **Occupational Completion Point: C** **Computer Programmer – 150 Hours – SOC Code 15-1131**	
32.0	Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:
32.01	Demonstrate the understanding and use of classes, objects, attributes, and behaviors.
32.02	Demonstrate the understanding and use of inheritance.
32.03	Demonstrate the understanding and use of data encapsulation.
32.04	Demonstrate the understanding and use of polymorphism.
33.0	Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements. – The student will be able to:
33.01	Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.
33.02	Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.
33.03	Design an object-oriented program using UML or another standard design methodology.
33.04	Work with other team members to develop a project plan for a program.
33.05	Work with other team members to write a design document for a program with multiple functions and shared data.
33.06	Participate in design meetings that review program design documents for conformance to program requirements.
33.07	Estimate the time to develop a program or module.
34.0	Design, document, and create object-oriented computer programs. – The student will be able to:
34.01	Compare and contrast recursive functions to other iterative methods.
34.02	Understand the implementation of character strings in the programming language.
34.03	Write programs that perform string processing (*e.g.*, string manipulation, string compares, concatenation).
34.04	Write programs that use user-defined data types.
34.05	Write object-oriented programs that use inheritance.
34.06	Write object-oriented programs that use polymorphism.
34.07	Develop class constructors.

	34.08	Write programs that define and use program constants.
	34.09	Write programs that perform error handling.
	34.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.
	34.11	Write programs that perform dynamic memory allocation.
	34.12	Write programs that perform effective management of dynamically allocated memory.
	34.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal, external) related to version control.
	34.14	Write programs that use complex data structures (*e.g.*, stacks, queues, trees, linked lists).
	34.15	Write programs that are event-driven.
	34.16	Write programs that perform file input and output (*i.e.*, sequential and random access file input/output).
	34.17	Perform basic database commands including connect, open, select, and close.
35.0	Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results. – The student will be able to:	
	35.01	Develop a test plan for an object-oriented program.
	35.02	Write test plans for event-driven programs.
	35.03	Write test plans for programs that perform file input and output.
	35.04	Perform test and debug activities on object-oriented programs, including those written by someone else.
	35.05	Perform test and debug activities on an event-driven program.
	35.06	Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.
	35.07	Document the findings of testing in a test report.

Course Number: CTS0062 **Occupational Completion Point: D** **Database Programmer – 600 Hours – SOC Code 15-1131**	
36.0	Develop an awareness of the changes taking place in the information age and how they fit into an evolving society. – The student will be able to:
36.01	Cite examples of jobs, salary, and opportunities he/she will have as a database programmer.
36.02	Describe the role a database plays in a business.
36.03	Understand the importance of clear communication when discussing business informational requirements.
36.04	Identify important historical contributions in database development and design.
37.0	Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs. – The student will be able to:
37.01	Identify and analyze the phases of the database development process.
37.02	Explain what logical data modeling and database design involve.
37.03	Compare database development process with that of the application development process.
37.04	Distinguish between a logical model and a physical implementation.
38.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:
38.01	Identify and model various types of entities.
38.02	Identify naming and drawing conventions for entities.
38.03	Sequence the steps that are necessary for creation of an entity.
38.04	Analyze and model the relationships between entities.
39.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:
39.01	Analyze and model attributes.
39.02	Identify unique identifiers for each entity.
39.03	Develop an entity relationship diagram tagging attributes with optionality.
40.0	Consider the degree and optionality of relationships of entities. – The student will be able to:
40.01	Create entity relationship models based on information requirements and interviews.
40.02	Differentiate between one-to-many, many-to-many and one-to-one relationships.

	40.03 Identify relationship between two entities by reading a given diagram.
	40.04 Create a relationship between instances of the same entity.
	40.05 Read an entity relationship model in order to validate it.
41.0	Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams. – The student will be able to:
	41.01 Identify the significance of an attribute that has more than one value for each entity instance.
	41.02 Evaluate appropriate methods of storing validation rules for attributes.
	41.03 Recognize unique identifiers inherited from other entities.
	41.04 Sequence the steps involved in resolving a many-to-many relationship.
42.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:
	42.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).
	42.02 Resolve many-to-many relationships with intersection entities.
	42.03 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.
	42.04 Create exclusive entities and relationships by using subtypes and arcs, respectively.
	42.05 Identify initial layout for presentation and generate a list of action items for members of group.
	42.06 Develop an entity relationship model using subtypes, supertypes and an exclusive arc.
43.0	Demonstrate proficiency in designing and adding complexity to an entity-relationship model (ERM). – The student will be able to:
	43.01 Revise an entity relationship model according to client requirements.
	43.02 Define and give examples of hierarchical and recursive relationships.
	43.03 Differentiate between transferable and non-transferable relationships.
	43.04 Deliver a professional, formal business style presentation.
	43.05 Evaluate and critique presentation layout, design and performance.
	43.06 Construct a model using both recursion and hierarchies to express the same logical meaning.
44.0	Apply complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:
	44.01 Describe a relational database and how it differs from other database systems.
	44.02 Define primary keys and foreign keys and describe their purpose.

	44.03 Describe what data integrity refers to and list some constraints.
	44.04 Explain how database design fits into the database development process.
	44.05 Translate an entity-relationship model into a relational database design.
	44.06 Document a database design using table instance charts.
45.0	Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved. – The student will be able to:
	45.01 Demonstrate ability to implement steps for mapping entity relationship models for implementation.
	45.02 Document an initial database design on table instance charts.
	45.03 Recognize raw data and evaluate the steps for creating a data group in unnormalized form.
46.0	Demonstrate proficiency in the technique of normalization and denormalization by labeling and organizing all items in a database in such a way as to prevent any confusion or mistakes. – The student will be able to:
	46.01 Differentiate between denormalized data and normalized.
	46.02 Move data from and denormalized form through to a third normal form.
	46.03 Demonstrate ability to test data groups for third normal form compliance.
	46.04 Identify optimized data groups from given groups of normalized data.
47.0	Demonstrate proficiency in table normalization by combining the techniques of an entity relationship model or a top-down, business approach to data with normalization or a bottom-up mathematical approach to data. – The student will be able to:
	47.01 Compare the normalization and entity relationship modeling (ERM) techniques in terms of strengths and weaknesses.
	47.02 Further define normalization and explain its benefits.
	47.03 Place tables in third normal form.
	47.04 Explain how logical data modeling rules ensure normalized tables.
	47.05 Specify referential integrity constraints and design indices.
48.0	Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database. – The student will be able to:
	48.01 Evaluate the transformation of business requirements into an initial layout and design for a database.
	48.02 Construct simple web page design for personal work folder.
	48.03 Evaluate existing web sites and determine quality of design.

49.0	Extend the logical model presentation model by normalizing the data and mapping the management system. – The student will be able to:
49.01	Formulate a plan of action for the Database Project using skills previously learned in this course.
49.02	Normalize a logical model to the third normal form (3NF).
49.03	Create a table in the database using a database authoring tool.
49.04	Demonstrate ability to edit tables using a database authoring tool.
49.05	Create forms that will display the table components created with a database authoring tool.
50.0	Apply techniques for building a storage management system by creating a website using templates and wizards. – The student will be able to:
50.01	Create a web site that displays the database project home.
50.02	Link a web site to create a web-enabled interface to the industry database.
50.03	Edit the forms created and specify appropriate field labels for data entry.
51.0	Demonstrate design and functionality of a database by constructing a group business presentation. – The student will be able to:
51.01	Evaluate and generate criteria for a formal, business presentation.
51.02	Construct a persuasive group presentation using the guidelines set forth in class.
52.0	Demonstrate comprehension of database modeling competency through group presentation. – The student will be able to:
52.01	Deliver a formal business presentation for the class that discusses an entity-relationship model and initial database design.
52.02	Demonstrate the functionality of the database and the layout/design capabilities of a database authoring tool.
52.03	Prepare appropriate end-user documentation.
52.04	Self-assess learning experience through the presentation and demonstration of their final database project.
53.0	Demonstrate comprehension that the database management software is a system for organizing the storage unit (or database) according to business needs and rules, through data integrity constraints. – The student will be able to:
53.01	Identify the structural elements of a relational database table.
53.02	List and describe the system development life cycle.
53.03	Describe the industry implementation of the relational database management system (RDBMS) and object relational database management system (ORDBMS).
53.04	Explain how SQL and languages that extend SQL are used in the industry product set.
53.05	Identify the advantages of a database management system.

54.0	Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements. – The student will be able to:
54.01	List the capabilities of SQL SELECT statements.
54.02	Execute a basic select statement.
54.03	Differentiate between SQL statements and language commands that extend SQL.
55.0	Demonstrate proficiency working with columns, characters, and rows in SQL. – The student will be able to:
55.01	Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.
55.02	Use column aliases to rename columns in the query result.
55.03	Eliminate duplicate rows in the query result.
55.04	Display the structure of a table.
55.05	Apply SQL syntax to restrict the rows returned from a query.
55.06	Demonstrate application of the WHERE clause syntax.
55.07	Construct and produce output using a SQL query containing character strings and date values.
56.0	Demonstrate proficiency in using SQL comparison operators. – The student will be able to:
56.01	Apply the proper comparison operator to return a desired result.
56.02	Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result.
56.03	Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable.
56.04	Explain the use of comparison conditions and NULL.
57.0	Demonstrate proficiency in using logical comparisons and precedence rules. – The student will be able to:
57.01	Evaluate logical comparisons to restrict the rows returned based on two or more conditions.
57.02	Apply the rules of precedence to determine the order in which expressions are evaluated and calculated.
57.03	Construct a query to order a results set for single or multiple columns.
57.04	Construct a query to sort a results set in ascending or descending order.
58.0	Demonstrate proficiency using SQL single row functions. – The student will be able to:
58.01	Perform calculations on data.
58.02	Modify individual data items.

	58.03 Use character, number and date functions in SELECT statements.
	58.04 Format data and numbers for display purposes.
	58.05 Convert column data types.
59.0	Demonstrate proficiency displaying data from multiple tables. – The student will be able to:
	59.01 Construct select statements to access data from more than one table using equity and non-equality joins.
	59.02 Use outer joins through viewing data that generally does not meet a join condition.
	59.03 Join a table to itself.
60.0	Demonstrate proficiency aggregating data using group functions. – The student will be able to:
	60.01 Identify the available group functions and describe their use.
	60.02 Demonstrate the ability to group data through the use of the GROUP BY clause.
	60.03 Demonstrate the ability to include or exclude grouped rows by using the HAVING clause.
61.0	Demonstrate proficiency utilizing subqueries. – The student will be able to:
	61.01 Write a query with an embedded subquery.
	61.02 Evaluate and perform a multiple-column subquery.
	61.03 Describe and explain the behavior of subqueries when null values are retrieved.
	61.04 Create a subquery in a FROM clause.
62.0	Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language. – The student will be able to:
	62.01 Produce queries that require an input variable.
	62.02 Customize the SQL language interface and reporting environment using SET commands for control.
	62.03 Produce more readable output through the use of the column and break commands.
	62.04 Describe data manipulation language (DML) and describe various DML statements.
	62.05 Utilize data manipulation language (DML) through inserting, updating and deleting rows from a table.
	62.06 Control transactions using COMMIT and ROLLBACK statements.

63.0	Demonstrate proficiency creating and managing database objects. – The student will be able to:
	63.01 Describe the main database objects.
	63.02 Create tables and alter their definitions.
	63.03 Describe the data types that can be used when specifying column definition.
64.0	Demonstrate proficiency altering tables and constraints implementing views. – The student will be able to:
	64.01 Create, drop, rename and truncate tables using SQL.
	64.02 Identify and describe various constraints including not null, unique, primary key, foreign key, and check.
	64.03 Create and maintain constraints including adding, dropping, enabling, disabling, and cascading.
	64.04 Recognize views and explain how they are created, how they retrieve data and how they perform DML operations.
65.0	Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects. – The student will be able to:
	65.01 Create views, retrieve data through a view, alter the definition of a view and drop a view.
	65.02 Categorize information by using Top-N queries to retrieve specified data.
	65.03 Identify the features of a sequence and display sequence values using a data dictionary view.
	65.04 Identify the characteristics of a cached sequence.
	65.05 Modify and remove a sequence using a SQL statement.
	65.06 Identify the features of private and public synonyms.
	65.07 Identify characteristics of an index and describe different types.
	65.08 Create and remove an index using a SQL statement.
66.0	Demonstrate ability to control user access and SQL language interface and reporting tool. – The student will be able to:
	66.01 Identify the features of database security.
	66.02 Create users using SQL statements.
	66.03 Grant and revoke object privileges using a SQL language interface and reporting tool.
67.0	Demonstrate comprehension of bundling features of SQL. – The student will be able to:
	67.01 List and describe the benefits of extension languages to SQL.
	67.02 Recognize the basic SQL block and its sections.

	67.03 Declare SQL variables and describe their significance.
	67.04 Execute a SQL block.
68.0	Demonstrate comprehension working with composite data types by writing executable script files. – The student will be able to:
	68.01 Recognize the significance of the executable section and decide when to use it.
	68.02 Write statements in the executable section.
	68.03 Describe the rules of nested blocks.
	68.04 Identify and utilize appropriate coding conventions.
	68.05 Create a script that will insert, update, merge and delete data in a table.
69.0	Describe the differences between SQL and SQL extension languages. – The student will be able to:
	69.01 Describe SQL extension languages.
	69.02 Differentiate between SQL and SQL extension languages.
	69.03 Explain the need for and benefits of SQL extension languages.
70.0	Create program blocks. – The student will be able to:
	70.01 Describe the structure of a program block.
	70.02 Identify the different types of program blocks.
	70.03 Identify program programming environments.
	70.04 Create and execute an anonymous block.
	70.05 Output messages in program blocks.
71.0	Use variables in program blocks. – The student will be able to:
	71.01 Describe how variables are used in program blocks.
	71.02 Identify the syntax for using variables.
	71.03 Declare and initialize variables.
	71.04 Assign new values to variables.

72.0	Recognize lexical units. – The student will be able to:
	72.01 Describe the types of lexical units.
	72.02 Describe identifiers and identify valid and invalid identifiers.
	72.03 Describe and identify reserved words, delimiters, literals, and comments.
73.0	Recognize data types. – The student will be able to:
	73.01 Describe the data type categories.
	73.02 Give examples of scalar, composite, and large object (LOB) data types.
	73.03 Identify when an object becomes eligible for garbage collection.
74.0	Use scalar data types. – The student will be able to:
	74.01 Declare and use scalar data types.
	74.02 Define guidelines for declaring and initializing variables.
75.0	Use various types of joins. – The student will be able to:
	75.01 Construct and execute SELECT statements using an equijoin.
	75.02 Construct and execute SELECT statements using a non-equijoin.
	75.03 Construct and execute SELECT statements using an outer join.
	75.04 Construct and execute SELECT statements that result in a Cartesian product.
76.0	Use SQL group functions and subqueries. – The student will be able to:
	76.01 Construct and execute an SQL query using group aggregate functions to determine a sum total, an average amount, and a maximum value.
	76.02 Construct and execute an SQL query that groups data based on specified criteria.
	76.03 Construct and execute an SQL query that contains a WHERE clause using a single-row subquery.
	76.04 Construct and execute an SQL query that contains a WHERE clause using a multiple-row subquery.
77.0	Write executable statements. – The student will be able to:
	77.01 Construct variable assignment statements.
	77.02 Construct statements using built-in SQL functions.

	77.03 Differentiate between implicit and explicit data type conversions.
	77.04 Describe when implicit data type conversions take place.
	77.05 List the drawbacks of implicit data type conversions.
	77.06 Construct statements using functions to explicitly convert data types.
	77.07 Construct statements using operators.
78.0	Use nested blocks and variable scope. – The student will be able to:
	78.01 Understand the scope and visibility of variables.
	78.02 Write nested blocks and qualify variables with labels.
	78.03 Describe the scope of an exception.
	78.04 Describe the effect of exception propagation in nested blocks.
79.0	Use good programming practices. – The student will be able to:
	79.01 List examples of good programming practices.
	79.02 Insert comments into code.
	79.03 Follow formatting guidelines when writing code.
80.0	Write DML statements to manipulate data. – The student will be able to:
	80.01 Construct and execute a statement to insert data into a table.
	80.02 Construct and execute a statement to update data in a table.
	80.03 Construct and execute a statement to delete data from a table.
	80.04 Construct and execute a statement to merge data into a table.
81.0	Retrieve data. – The student will be able to:
	81.01 Identify SQL statements that can be directly included in an executable block.
	81.02 Construct and execute an INTO clause to hold values returned by a single-row SELECT statement.
	81.03 Construct statements that retrieve data.

82.0	Manipulate data. – The student will be able to:
	82.01 Construct and execute statements that manipulate data with DML statements.
	82.02 Describe when to use implicit or explicit cursors.
	82.03 Create code to use SQL implicit cursor attributes to evaluate cursor activity.
83.0	Use transaction control statements. – The student will be able to:
	83.01 Define a transaction and give an example.
	83.02 Construct and execute a transaction control statement.
84.0	Use IF conditional control statements. – The student will be able to:
	84.01 Construct and use an IF statement.
	84.02 Construct and use an IF -ELSIF statement.
	84.03 Create PL/SQL to handle null conditions in an IF statement.
85.0	Use CASE conditional control statements. – The student will be able to:
	85.01 Construct and use CASE statements.
	85.02 Construct and use CASE expressions.
	85.03 Include syntax to handle null conditions in a CASE statement.
	85.04 Include syntax to handle Boolean conditions in IF and CASE statements.
86.0	Use basic LOOP iterative control statements. – The student will be able to:
	86.01 Describe the types of LOOP statements and their uses.
	86.02 Create a program containing a basic loop and an EXIT statement.
	86.03 Create a program containing a basic loop and an EXIT statement with conditional termination.
87.0	Use WHILE and FOR loop iterative control statements. – The student will be able to:
	87.01 Construct and use the WHILE looping construct.
	87.02 Construct and use the FOR looping construct.
	87.03 Describe when a WHILE loop is used.
	87.04 Describe when a FOR loop is used.

88.0	Use nested loop iterative control statements. – The student will be able to:
	88.01 Construct and execute a program using nested loops.
	88.02 Evaluate a nested loop construct and identify the exit point.
89.0	Use explicit cursors. – The student will be able to:
	89.01 List the guidelines for declaring and controlling explicit cursors.
	89.02 Create code to open a cursor and fetch a piece of data into a variable.
	89.03 Use a simple loop to fetch multiple rows from a cursor.
	89.04 Create code to close a cursor.
90.0	Use explicit cursor attributes. – The student will be able to:
	90.01 Define a record structure.
	90.02 Create code to process the row of an active set using record types in cursors.
	90.03 Use cursor attributes to retrieve information about the state of an explicit cursor.
91.0	Use cursor FOR loops. – The student will be able to:
	91.01 List and explain the benefits of using Cursor FOR loops.
	91.02 Create code to declare a cursor and manipulate it in a FOR loop.
	91.03 Create code containing a Cursor FOR loop using a subquery.
92.0	Use cursors with parameters. – The student will be able to:
	92.01 List the benefits of using parameters with cursors.
	92.02 Create code to declare and manipulate a cursor with a parameter.
93.0	Use cursors for update transactions. – The student will be able to:
	93.01 Create code to lock rows before an update using the appropriate clause.
	93.02 Explain the effect of using NOWAIT in an update cursor declaration.
	93.03 Create code to use the current row of the cursor in an UPDATE or DELETE statement.

94.0	Use multiple cursors. – The student will be able to:
	94.01 Explain the need for using multiple cursors to produce multilevel reports.
	94.02 Create code to declare and manipulate multiple cursors within nested loops.
	94.03 Create code to declare and manipulate multiple cursors using parameters.
95.0	Handle exceptions. – The student will be able to:
	95.01 Describe the advantages of including exception handling code.
	95.02 Describe the purpose of an EXCEPTION section in a program block.
	95.03 Create code to include an EXCEPTION section.
	95.04 List the guidelines for exception handling.
96.0	Trap server exceptions. – The student will be able to:
	96.01 Distinguish between errors defined by the server and those defined by the programmer.
	96.02 Differentiate between errors that are handled implicitly and explicitly by the server.
	96.03 Write code to trap a predefined server error.
	96.04 Write code to trap a non-predefined server error.
	96.05 Write code to identify an exception by error code and by error message.
97.0	Trap user-defined exceptions. – The student will be able to:
	97.01 Write code to name a user-defined exception.
	97.02 Write code to raise an exception.
	97.03 Write code to handle a raised exception.
98.0	Create procedures. – The student will be able to:
	98.01 Differentiate between anonymous blocks and subprograms.
	98.02 Identify the benefits of using subprograms.
	98.03 Describe a stored procedure.
	98.04 Create a procedure.
	98.05 Describe how a stored procedure is invoked.

99.0	Use parameters in procedures. – The student will be able to:
	99.01 Describe how parameters contribute to a procedure.
	99.02 Define a parameter.
	99.03 Create a procedure using a parameter.
	99.04 Invoke a procedure that has parameters.
	99.05 Distinguish between formal and actual parameters.
100.0	Pass parameters. – The student will be able to:
	100.01 List the types of parameter modes.
	100.02 Create a procedure that passes parameters.
	100.03 Identify methods for passing parameters.
	100.04 Describe the default option for parameters.
101.0	Create stored functions. – The student will be able to:
	101.01 Describe the difference between a stored procedure and a stored function.
	101.02 Create a program block containing a function.
	101.03 Identify ways in which functions may be invoked.
	101.04 Create a program block that invokes a function that has parameters.
102.0	Use functions in SQL statements. – The student will be able to:
	102.01 Describe where user-defined functions can be called from within an SQL statement.
	102.02 Describe the restrictions on calling functions from SQL statements.
	102.03 Describe the purpose of the Data Dictionary.
	102.04 Differentiate between the three types of Data Dictionary views.
	102.05 Write SQL SELECT statements to retrieve information from the Data Dictionary.
103.0	Manage procedures and functions. – The student will be able to:
	103.01 Describe how exceptions are propagated.

	103.02 Remove a function and a procedure.
	103.03 Use Data Dictionary views to identify and manage stored procedures.
104.0	Manage object privileges. – The student will be able to:
	104.01 List and explain several object privileges.
	104.02 Explain the function of the EXECUTE object privilege.
	104.03 Write SQL statements to grant and revoke object privileges.
105.0	Use invoker's rights. – The student will be able to:
	105.01 Contrast invoker's rights with definer's rights.
	105.02 Create a procedure that uses invoker's rights.
106.0	Create packages. – The student will be able to:
	106.01 Describe a package, its components, and the reasons for use.
	106.02 Create packages containing related variables, cursors, constants, exceptions, procedures, and functions.
	106.03 Create a program block that invokes a package construct.
107.0	Manage package constructs. – The student will be able to:
	107.01 Explain the difference between public and private package constructs.
	107.02 Designate a package construct as either public or private.
	107.03 Specify the syntax to drop a package.
	107.04 Identify Data Dictionary views used to manage packages.
	107.05 Identify the guidelines for using packages.
108.0	Use advanced package concepts. – The student will be able to:
	108.01 Write packages that use the overloading feature.
	108.02 Write packages that use forward declarations.
	108.03 Explain the purpose of a package initialization block.
	108.04 Identify restrictions on using packaged functions in SQL statements.

109.0 Manage persistent state of package variables. – The student will be able to:
109.01 Identify persistent states of package variables.
109.02 Control the persistent state of a package cursor.
110.0 Use vendor-supplied packages. – The student will be able to:
110.01 Describe two common uses for vendor-supplied packages.
110.02 Use the syntax to specify messages for a vendor-supplied package.
110.03 Identify the exceptions used in conjunction with vendor-supplied packages.
111.0 Understand dynamic SQL. – The student will be able to:
111.01 Identify the stages through which all SQL statements pass.
111.02 Describe the reasons for using dynamic SQL to create an SQL statement.
111.03 List statements supporting Native Dynamic SQL.
112.0 Understand triggers. – The student will be able to:
112.01 Describe database triggers and their uses.
112.02 Differentiate between a database trigger and an application trigger.
112.03 List the guidelines for using triggers.
112.04 Compare and contrast database triggers and stored procedures.
113.0 Create DML triggers. – The student will be able to:
113.01 Create a DML trigger and identify its components.
113.02 Create a statement level trigger.
113.03 Describe the trigger firing sequence options.
113.04 Create a DML trigger that uses conditional predicates.
113.05 Create a row level trigger.
113.06 Create a row level trigger that uses OLD and NEW qualifiers.
113.07 Create an INSTEAD OF trigger.

114.0 Create DDL and database event triggers. – The student will be able to:
114.01 Describe the events that cause DDL and database event triggers to fire.
114.02 Create a trigger for a DDL statement.
114.03 Create a trigger for a database event.
114.04 Describe the functionality of the CALL statement.
114.05 Describe the cause of a mutating table.
115.0 Manage triggers. – The student will be able to:
115.01 View trigger information in the Data Dictionary.
115.02 Disable and enable a database trigger.
115.03 Remove a trigger from the database.
116.0 Use large object data types. – The student will be able to:
116.01 Compare and contrast LONG and LOB data types.
116.02 Describe LOB data types and how they are used.
116.03 Differentiate between internal and external LOBs.
116.04 Create and maintain LOB data types.
116.05 Migrate data from LONG to LOB.
117.0 Manage binary types. – The student will be able to:
117.01 Define binary column data type.
117.02 Create directory objects and view them in the Data Dictionary.
117.03 Manage and manipulate binary types.
118.0 Manage indexes. – The student will be able to:
118.01 Create and manipulate user-defined records.
118.02 Create an index.

	118.03 Describe the difference between records, tables, and indexes.
119.0	Manage dependencies. – The student will be able to:
	119.01 Describe the implications of procedural dependencies.
	119.02 Contrast dependent objects and referenced objects.
	119.03 View dependency information in the Data Dictionary.
	119.04 Use a script to create the objects required to display dependencies.
	119.05 Use views to display dependencies.
	119.06 Describe how to minimize dependency failures.
120.0	Program a database application. – The student will be able to:
	120.01 Utilize loop statements.
	120.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
	120.03 Create user-defined functions.
	120.04 Utilize common built-in functions.
	120.05 Declare variables in modules and procedures.
	120.06 Declare arrays, and initialize elements of arrays.
	120.07 Declare and use object variables and collections, and use their associated properties and methods.
	120.08 Declare symbolic constants, and make them available locally or publicly.
	120.09 Respond to events.
121.0	Utilize the basic concepts of database design. – The student will be able to:
	121.01 Apply basic concepts of normalization.
	121.02 Utilize the cascade update and cascade delete options.
122.0	Utilize SQL and union queries. – The student will be able to:
	122.01 Utilize SQL to write common queries.
	122.02 Refer to objects by using SQL.

	122.03 Utilize union queries.
123.0	Implement program statements using objects. – The student will be able to:
	123.01 Determine when to use data access objects.
	123.02 Differentiate between objects and collections.
	123.03 Write statements that access and modify database objects.
	123.04 Utilize data access objects.
	123.05 Select appropriate methods and property settings for use with specified objects.
124.0	Utilize debugging tools and write error handlers. – The student will be able to:
	124.01 Trap errors.
	124.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.
	124.03 Debug code samples.
	124.04 Utilize the Debugger to monitor variable values.
	124.05 Write an error handler.
125.0	Demonstrate file I/O. – The student will be able to:
	125.01 Read from files.
	125.02 Write to files.
	125.03 Utilize record locking.
126.0	Create forms and identify all the properties of a form. – The student will be able to:
	126.01 Choose form-specific and report-specific properties to set.
	126.02 Choose control properties to set.
	126.03 Assign event-handling procedures to controls in a form.
	126.04 Define and create form and report modules.
	126.05 Identify the scope of a form or report module.
	126.06 Open multiple instances of a form, and refer to them.

	126.07 Assign values to form properties.
	126.08 Use form methods.
127.0	Manipulate data using object models. – The student will be able to:
	127.01 Connect to a data source.
	127.02 Open a recordset.
	127.03 Insert, update, merge and delete data.
128.0	Develop custom controls. – The student will be able to:
	128.01 Set properties for custom controls.
	128.02 Customize user interface controls.
129.0	Utilize API functions. – The student will be able to:
	129.01 Properly declare functions.
	129.02 Use the by value and by reference parameters.
130.0	Demonstrate database replication and implement database replication using programming tools. – The student will be able to:
	130.01 Make a database replicable.
	130.02 View a synchronization schedule.
	130.03 Explain how synchronization conflicts are resolved.
	130.04 Identify the advantages of using replication of synchronization.
	130.05 Identify the changes that the database engine makes when it converts a nonreplicable database into replicable database.
131.0	Analyze and implement security options. – The student will be able to:
	131.01 Analyze a scenario, and recommend an appropriate type of security.
	131.02 Explain the steps for implementing security.
	131.03 Analyze code to ensure that it sets security options.
	131.04 Write code to implement security options.

132.0 Implement client/server applications. – The student will be able to:
132.01 Demonstrate SQL pass through queries and application queries.
132.02 Access external data.
132.03 Trap errors that are generated by the server.
132.04 Optimize connections.
132.05 Optimize performance for a given client/server application.
133.0 Optimize the performance of a database. – The student will be able to:
133.01 Differentiate between single-field and multiple-field indexes.
133.02 Optimize queries.
133.03 Restructure queries to allow faster execution.
133.04 Optimize performance in distributed applications.
133.05 Optimize performance for client/server applications.
134.0 Perform application distribution. – The student will be able to:
134.01 Prepare an application for distribution.
134.02 Analyze various methods to distribute a client/server application.
134.03 Distribute custom controls with an application.
134.04 Provide online help.
135.0 Test and debug databases. – The student will be able to:
135.01 Implement error handling.
135.02 Test and debug library databases.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **.NET Application Development & Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y700400
CIP Number	0511020314
Grade Level	30, 31
Standard Length	1050 hours
Teacher Certification	BUS ED 1 @2 COMP SCI 6 COMP PROG 7 G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the fundamentals of programming and software development; procedural and object-oriented programming; creating .NET-based applications, including testing, monitoring, debugging, documenting, and maintaining .NET applications.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points, with OCPs A, B, and C.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	CTS0041	Computer Programmer Assistant	300 hours	15-1131
C	CTS0044	Computer Programmer	150 hours	15-1131
D	CTS0032	.NET Programmer	450 hours	15-1131

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
16.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
17.0 Distinguish between iterative and non-iterative program control structures.
18.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
19.0 Describe the processes, methods, and conventions for software development and maintenance.
20.0 Explain the types, uses, and limitations of testing for ensuring quality control.
21.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
22.0 Describe information security risks, threats, and strategies associated with software development.
23.0 Design a computer program to meet specific physical, operational, and interaction criteria.
24.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
25.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
26.0 Create a unit test plan, implement the plan, and report the results of testing.
27.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
28.0 Solve problems using critical thinking skills, creativity and innovation.
29.0 Use information technology tools.
30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
31.0 Describe the importance of professional ethics and legal responsibilities.

32.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
33.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
34.0 Design, document, and create object-oriented computer programs.
35.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
36.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
37.0 Understand .NET primitive data types and their uses.
38.0 Describe the types and characteristics of lexical units in the .NET programming language.
39.0 Construct statements that use various .NET operators.
40.0 Construct and use .NET selection control structures.
41.0 Construct and use .NET iterative control structures.
42.0 Construct and use .NET structures for error handling.
43.0 Write .NET programs that define and use user-defined data types, including classes.
44.0 Write .NET programs that define and use methods.
45.0 Write programs that perform console input and output in a .NET program.
46.0 Use namespaces in a .NET program.
47.0 Use arrays in .NET programs.
48.0 Write .NET programs that use the object-oriented concept of inheritance.
49.0 Write .NET programs that use the object-oriented concept of polymorphism.
50.0 Write .NET programs that use the object-oriented concept of encapsulation.
51.0 Apply common programming style guidelines and conventions.
52.0 Use application life cycle management to develop and maintain .NET programs.
53.0 Use nullable values in a .NET program.
54.0 Use the .NET String and StringBuilder classes in an application.
55.0 Use .NET classes to perform stream input/output.
56.0 Use recursive functions to solve problems in .NET programs.
57.0 Write .NET programs that use interfaces.
58.0 Use .NET collections in applications.
59.0 Demonstrate knowledge of different types of .NET applications.
60.0 Demonstrate knowledge of .NET architecture and tools.
61.0 Demonstrate knowledge of Web applications.
62.0 Develop Web pages using HTML, CSS, JavaScript, and ASP.NET.
63.0 Develop .NET Windows Form applications.
64.0 Develop Windows Service applications and class libraries.
65.0 Demonstrate knowledge of database applications.
66.0 Demonstrate knowledge of structured query language (SQL) statements.
67.0 Develop .NET database applications.
68.0 Successfully work as a member of a software development team.
69.0 Manage time according to a plan.
70.0 Keep acceptable records of progress problems and solutions.
71.0 Plan, organize, and carry out a project plan.
72.0 Manage resources.
73.0 Use tools, materials, and processes in an appropriate and safe manner.

74.0 Demonstrate an understanding of the software development process.
75.0 Research content related to the project and document the results following industry conventions.
76.0 Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience.
77.0 Demonstrate competency in the area of expertise related to developing computer software using the .NET framework.

Florida Department of Education
Student Performance Standards

Program Title: .NET Application Development & Programming
PSAV Number: Y700400

Course Number: OTA0040
Occupational Completion Point: A
Information Technology Assistant – 150 Hours – SOC Code 15-1151

Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
15.0	Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:
15.01	Describe the evolution of programming and programming careers.
15.02	Identify tasks performed by programmers.
15.03	Describe how businesses use computer programming to solve business problems.
15.04	Investigate job opportunities in the programming field.
15.05	Explain different specializations and the related training in the computer programming field.
15.06	Explain the need for continuing education and training of computer programmers.
15.07	Explain enterprise software systems and how they impact business.
15.08	Describe ethical responsibilities of computer programmers.
15.09	Describe the role of customer support to software program quality.
15.10	Identify credentials and certifications that may improve employability for a computer programmer.
15.11	Identify devices, tools, and other environments for which programmers may develop software.
16.0	Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:
16.01	Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.
16.02	Explain the types and uses of variables in programs.
16.03	Determine the best data type to use for given programming problems.
16.04	Identify the types of operations that can be performed on different data types.
16.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.
16.06	Explain how computers store different data types in memory.
16.07	Demonstrate the difference between "data" and "information".
16.08	Use different number systems to represent data.
16.09	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.

	16.10 Use Boolean logic to perform logical operations.
17.0	Distinguish between iterative and non-iterative program control structures. – The student will be able to:
	17.01 Explain non-iterative programming structures (e.g., if, if/else) and their uses.
	17.02 Explain iterative programming structures (e.g., while, do/while) and their uses.
18.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:
	18.01 Identify the characteristics, uses, and limits of low-level programming languages.
	18.02 Identify the characteristics, uses, and limits of high-level programming languages.
	18.03 Identify the characteristics, uses, and limits of rapid development programming languages.
	18.04 Describe object-oriented concepts.
	18.05 Explain the characteristics of procedural and object-oriented programming languages.
	18.06 Compare and contrast programming languages that are compiled (e.g., C++), interpreted (e.g., Basic, HTML), and translated (e.g., Java).
19.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:
	19.01 Describe and explain tools used in software development.
	19.02 Describe the stages of the program life cycle.
	19.03 Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).
	19.04 List and explain the steps in the program development cycle.
	19.05 Describe different types of documentation used in the program development cycle (e.g., requirements document, program design documents, test plans).
	19.06 Describe the on-going need for program maintenance.
	19.07 Describe different methods companies use to facilitate program updates for enhancements and defects (e.g., how customers receive patches, updates, new versions, upgrades).
	19.08 Describe different methods used to facilitate version control and change management.
20.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:
	20.01 Explain the uses and limits of testing in ensuring program quality.
	20.02 Explain testing performed at different stages of the program development cycle (e.g. unit testing, system testing, user acceptance testing).

	20.03 Describe data and the use of test plans/scripts to be used in program testing.
	20.04 Describe and identify types of programming errors (e.g., syntactical, logic, usability, requirements mismatch).
	20.05 Identify the data to be used for boundary conditions.
	20.06 Explain different types of testing (e.g., usability, automated, regression) and testing tools.
21.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:
	21.01 Describe different design methodologies and their uses (e.g., object-oriented design, structured design, and rapid application development).
	21.02 Describe tools for developing a program design (e.g., UML, flowcharts, design documents, pseudocode).
	21.03 Explain the role of existing libraries and packages in facilitating programmer productivity.
	21.04 Participate and contribute to a design review of a program design developed using a common program design tool (e.g., UML, flowcharts, design documents, pseudocode).
	21.05 Write a program design document using UML or other standard design methodology.
	21.06 Define input and output for a program module using UML or other standard design methodology.
22.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:
	22.01 Explain the security risks to personal and business computer users.
	22.02 Identify different types of threats to computer systems.
	22.03 Identify methods to protect against different threats to computer systems.
	22.04 Understand the importance of a disaster / emergency response plan.
	22.05 Identify alternative methods for data storage and backup (e.g., mirroring, fail-over, high availability, types of backups).
23.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:
	23.01 Choose appropriate data types depending on the needs of the program.
	23.02 Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).
	23.03 Design and develop program that are designed for efficiency (e.g., less memory usage, less inputs/outputs, faster processing).
	23.04 Identify the software environment required for a program to run (e.g., operating system required, mobile, Web-based, desktop, delivery method).

	23.05 Identify the tools required to develop a program (e.g., editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).
24.0	Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:
	24.01 Use appropriate naming conventions to define program variables and modules (methods, functions).
	24.02 Use a program editor to write the source code for a program.
	24.03 Write programs that use selection structures (e.g., if, if/else).
	24.04 Write programs that use repetition structures (e.g., while, do/while).
	24.05 Write programs that use nested structures.
	24.06 Use internal documentation (e.g., single-line and multi-line comments, program headers, module descriptions, and meaningful variable and function/module names) to document a program according to accepted standards.
	24.07 Compile and run programs.
	24.08 Write programs that use standard arithmetic operators with different numerical data types.
	24.09 Write programs that use standard logic operators.
	24.10 Write programs that use a variety of common data types.
	24.11 Write programs that perform data conversion between standard data types.
	24.12 Write programs that define, use, search, and sort arrays.
	24.13 Write programs that use user-defined data types.
	24.14 Demonstrate understanding and use of appropriate variable scope.
25.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:
	25.01 Write programs that perform user input and output.
	25.02 Write programs that validate user input (e.g., range checking, data formats, valid/invalid characters).
	25.03 Write program modules such as functions, subroutines, or methods.
	25.04 Write program modules that accept arguments.
	25.05 Write program modules that return values.
	25.06 Write program modules that validate arguments and return error codes.

	25.07 Write interactive programs.
	25.08 Write programs that use standard libraries to enhance program function.
	25.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
26.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	26.01 Write a unit test plan that identifies the input data and expected results for program tests.
	26.02 Test and debug programs, including programs written by others.
	26.03 Write a test report that identifies the results of testing.
	26.04 Trace through the function of a program to ensure valid operation.
	26.05 Identify the system resources used by the program (e.g., memory, disk space, execution time, external devices).
	26.06 Create a disaster / emergency response plan for a computer system.
27.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	27.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	27.02 Locate, organize and reference written information from various sources.
	27.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	27.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	27.05 Apply active listening skills to obtain and clarify information.
	27.06 Develop and interpret tables and charts to support written and oral communications.
	27.07 Exhibit public relations skills that aid in achieving customer satisfaction.
28.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	28.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	28.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	28.03 Identify and document workplace performance goals and monitor progress toward those goals.
	28.04 Conduct technical research to gather information necessary for decision-making.
29.0	Use information technology tools. – The student will be able to:
	29.01 Use personal information management (PIM) applications to increase workplace efficiency.

	29.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	29.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	29.04 Employ collaborative/groupware applications to facilitate group work.
30.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	30.01 Employ leadership skills to accomplish organizational goals and objectives.
	30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	30.03 Conduct and participate in meetings to accomplish work tasks.
31.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	31.01 Evaluate and justify decisions based on ethical reasoning.
	31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.

Course Number: CTS0044 **Occupational Completion Point: C** **Computer Programmer – 150 Hours – SOC Code 15-1131**	
32.0	Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:
32.01	Demonstrate the understanding and use of classes, objects, attributes, and behaviors.
32.02	Demonstrate the understanding and use of inheritance.
32.03	Demonstrate the understanding and use of data encapsulation.
32.04	Demonstrate the understanding and use of polymorphism.
33.0	Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements. – The student will be able to:
33.01	Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.
33.02	Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.
33.03	Design an object-oriented program using UML or another standard design methodology.
33.04	Work with other team members to develop a project plan for a program.
33.05	Work with other team members to write a design document for a program with multiple functions and shared data.
33.06	Participate in design meetings that review program design documents for conformance to program requirements.
33.07	Estimate the time to develop a program or module.
34.0	Design, document, and create object-oriented computer programs. – The student will be
34.01	Compare and contrast recursive functions to other iterative methods.
34.02	Understand the implementation of character strings in the programming language.
34.03	Write programs that perform string processing (e.g., string manipulation, string compares, concatenation).
34.04	Write programs that use user-defined data types.
34.05	Write object-oriented programs that use inheritance.
34.06	Write object-oriented programs that use polymorphism.
34.07	Develop class constructors.

	34.08	Write programs that define and use program constants.
	34.09	Write programs that perform error handling.
	34.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.
	34.11	Write programs that perform dynamic memory allocation.
	34.12	Write programs that perform effective management of dynamically allocated memory.
	34.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal and external) related to version control.
	34.14	Write programs that use complex data structures (e.g., stacks, queues, trees, linked lists).
	34.15	Write programs that are event-driven.
	34.16	Write programs that perform file input and output (i.e., sequential and random access file input/output).
	34.17	Perform basic database commands including connect, open, select, and close.
35.0	Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results. – The student will be able to:	
	35.01	Develop a test plan for an object-oriented program.
	35.02	Write test plans for event-driven programs.
	35.03	Write test plans for programs that perform file input and output.
	35.04	Perform test and debug activities on object-oriented programs, including those written by someone else.
	35.05	Perform test and debug activities on an event-driven program.
	35.06	Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.
	35.07	Document the findings of testing in a test report.

Course Number: CTS0032 **Occupational Completion Point: D** **.NET Programmer – 450 Hours – SOC Code 15-1131**	
36.0	Develop an awareness of the changes taking place in the information age and how they fit into an evolving society. – The student will be able to:
36.01	Cite examples of jobs, salary, and opportunities he/she will have as a .NET programmer.
36.02	Describe the role a database plays in a business.
36.03	Explain the value of middleware, such as the .NET framework, in developing software applications.
36.04	Understand the importance of clear communication when discussing business informational requirements.
37.0	Understand .NET primitive data types and their uses. – The student will be able to:
37.01	Describe how variables are used in programs.
37.02	Identify the .NET built-in value types, their uses, and the ranges of values supported by each type.
37.03	Identify the default values for built-in value types.
37.04	Write statements that declare and initialize variables.
37.05	Write statements that assign literal values to numeric types.
37.06	Identify the .NET built-in reference types.
37.07	Write statements that assign string literals to string types.
37.08	Explain the memory size requirements for the various data storage types.
37.09	Identify which types are stored on the heap and which are stored on the stack.
37.10	Identify which data type should be used for a given purpose in a program.
37.11	Write statements that create variables with values that cannot be changed (i.e., const, final).
37.12	Identify the syntax for declaring and initializing each of the built-in data types.
37.13	Differentiate between implicit and explicit data type conversions.
37.14	Describe when implicit data type conversions take place.
37.15	Write statements that use explicit type conversion.
37.16	List the drawbacks of implicit data type conversions.

	37.17 Compare and contrast boxing and unboxing.
	37.18 Describe the scope of a variable.
	37.19 Describe how the compiler uses scope to distinguish between variables with the same name.
38.0	Describe the types and characteristics of lexical units in the .NET programming language. – The student will be able to:
	38.01 Describe the types of lexical units (e.g., keywords, directives, operators).
	38.02 Describe identifiers and identify valid and invalid identifiers.
	38.03 Describe and identify reserved words, delimiters, literals, and comments.
39.0	Construct statements that use various .NET operators. – The student will be able to:
	39.01 Construct statements using arithmetic operators.
	39.02 Construct statements using relational operators.
	39.03 Construct and use statements using logical operators.
	39.04 Construct and use statements using assignment operators.
	39.05 Construct and execute statements using operator precedence.
	39.06 Construct and execute statements using methods and fields of the Math class.
40.0	Construct and use .NET selection control structures. – The student will be able to:
	40.01 Construct and use an if structure in a program.
	40.02 Construct and use an if/else structure in a program.
	40.03 Construct and use multiple-selection structures (e.g., switch, elseif, select) in programs.
	40.04 Construct and use nested selection structures in a program.
	40.05 Construct and use a conditional operator.
41.0	Construct and use .NET iterative control structures. – The student will be able to:
	41.01 Describe the types of iterative control structures and their uses.
	41.02 Construct and use a while structures (e.g., while, do/while, do/until) in a program.
	41.03 Construct and use a for structure in a program.

	41.04	Construct and use a control structure that iterates over each item in a collection (e.g., foreach, for/each/next).
	41.05	Describe the limits and advantages of different iterative control structure (i.e., while, do/while, for, foreach or for/each).
	41.06	Construct and use nested structures (iterative and selective) in a program.
	41.07	Write programs that alter the execution of program loops (e.g., break, continue, exit).
42.0	Construct and use .NET structures for error handling. – The student will be able to:	
	42.01	Describe the different types of software errors.
	42.02	Compare and contrast alternatives for handling errors.
	42.03	Write programs that validate user input and handle errors.
	42.04	Explain the correct method for using multiple catch blocks for exceptions.
	42.05	Explain the purpose of the finally block in exception handling.
	42.06	Write programs that handle exceptions using the try/catch/finally structure.
	42.07	Write programs with nested exception handling.
	42.08	Explain the concept of structured exception handling.
	42.09	Identify common exceptions and their causes.
	42.10	Explain the concept of throwing a new exception.
	42.11	Write programs that catch and re-throw exceptions.
	42.12	Write exception handlers that use characteristics of the exception argument in the program.
43.0	Write .NET programs that define and use user-defined data types, including classes. – The student will be able to:	
	43.01	Explain the concept of a user-defined data type.
	43.02	Distinguish between structures and classes.
	43.03	Identify the syntax for declaring enumerations and structures.
	43.04	Write programs that use declare and use enumerations.
	43.05	Write programs that declare and use structures.
	43.06	Explain the characteristics of different class constructs including instance variables, properties, fields, methods, events, object references, and constructors.

	43.07 Write programs that declare and use classes.
	43.08 Distinguish between different types of classes, including base class, derived class, abstract class, and sealed class.
	43.09 Explain the impact of using different access modifiers on user-defined data types.
	43.10 Use access modifiers in a program to control visibility to variables and user-defined data types.
	43.11 Explain the this reference and its uses.
44.0	Write .NET programs that define and use methods. – The student will be able to:
	44.01 Identify the benefits of using methods.
	44.02 Describe the different types of class methods and their purposes.
	44.03 Create class methods that do and do not return values.
	44.04 Write statements that invoke a method.
	44.05 Create a method using arguments.
	44.06 Invoke a method that has arguments.
	44.07 Describe a method signature.
	44.08 Describe the purpose of overloading methods.
	44.09 Write programs that have overloaded methods.
	44.10 Define methods that have default arguments.
	44.11 Describe the conflict between overloaded methods and default arguments.
	44.12 Explain the impact of using different access modifiers on class methods.
	44.13 Write methods that use argument modifiers (e.g., out, ref, byref, byval, const).
45.0	Write programs that perform console input and output in a .NET program. – The student will be able to:
	45.01 Use the Console class to read and write data from the console.
	45.02 Write statements that use escape sequences.
	45.03 Write statements that format string and numeric output.
	45.04 Write statements that use the ToString method to output data.

46.0	Use namespaces in a .NET program. – The student will be able to:
	46.01 Compare and contrast assemblies and namespaces.
	46.02 Describe the use of namespaces in .NET programming.
	46.03 Describe commonly used .NET namespaces (e.g., System, System.IO, System.Collections, System.Drawing).
	46.04 Identify the correct namespace to include for specified classes.
	46.05 Write programs that define a namespace.
	46.06 Create namespaces that abide by standard naming convention.
47.0	Use arrays in .NET programs. – The student will be able to:
	47.01 Write statements to declare and initialize an array.
	47.02 Demonstrate the use of initializer lists.
	47.03 Write methods that take an array as an argument.
	47.04 Write methods that return an array to the calling method.
	47.05 Write statements to update, and destroy arrays.
	47.06 Explain linear and binary searching.
	47.07 Use the static methods of the Array class to perform searches, binary searches, and sorts.
	47.08 Demonstrate the use of multidimensional arrays.
	47.09 Demonstrate the use of jagged arrays (array of arrays).
48.0	Write .NET programs that use the object-oriented concept of inheritance. – The student will be able to:
	48.01 Explain the purpose and use of inheritance in object oriented programming.
	48.02 Compare and contrast single and multiple inheritance.
	48.03 Explain the purpose and implementation of classes that cannot serve as a base class (a sealed class).
	48.04 Describe has-a and is-a relationships.
	48.05 Create class hierarchies using inheritance.
	48.06 Declare and use a class derived from another class (implementing an is-a relationship).

	48.07 Declare and use a class where the derived class overrides methods of the base class.
	48.08 Declare and use a class that contains another class as a data member (implementing a has-a relationship).
	48.09 Write statements that determine at run time whether an instance of a class is derived from a specific base class or interface.
	48.10 Write statements that invoke a method of the base class from a derived class.
	48.11 Identify which class methods can be inherited and which cannot.
	48.12 Explain how access modifiers affect the inheritance of class variables and methods.
49.0	Write .NET programs that use the object-oriented concept of polymorphism. – The student will be able to:
	49.01 Explain the purpose and implementation of classes that cannot be instantiated (an abstract class).
	49.02 Explain the purpose and implementation of virtual class methods that must be overridden by derived classes.
	49.03 Explain the use of abstract classes in enforcing polymorphism.
	49.04 Create an abstract class.
	49.05 Create classes that derive from an abstract class.
	49.06 Create a program that uses polymorphism.
50.0	Write .NET programs that use the object-oriented concept of encapsulation. – The student will be able to:
	50.01 Define and use classes that use access modifiers (e.g., private, public, protected, internal, internal protected) to provide encapsulation of data.
	50.02 Explain the restrictions on using accessibility levels.
	50.03 Compare and contrast different types of variable scope, including block, procedure, module/class, and project scope.
	50.04 Compare and contrast different types of method scope, including public, private, protected, friend, and protectedfriend.
	50.05 Write programs that use local variables.
	50.06 Describe the scope of a given variable.
	50.07 Describe how the compiler uses scope to distinguish between variables with the same name.
	50.08 Explain the purpose and use of static classes, variables and methods.
	50.09 Write programs that create and use static classes, variables, and methods.

51.0	Apply common programming style guidelines and conventions. – The student will be able to:
51.01	List examples of good programming practices.
51.02	Insert comments into code.
51.03	Follow formatting guidelines when writing code.
51.04	Define guidelines for declaring and initializing variables.
52.0	Use application life cycle management to develop and maintain .NET programs. – The student will be able to:
52.01	Describe the stages in the life cycle of an application.
52.02	Describe tools used to manage each stage in the life cycle of an application and how each is used to ensure the integrity of the product.
52.03	Describe how the needs of the customer affect the development of an application.
52.04	Describe the different types of testing that are performed on an application.
52.05	Describe the role of tools such as UML (Unified Modeling Language) in ensuring the integrity of the application.
52.06	Describe different types of UML diagrams and guidelines for their use.
52.07	Develop a class based on its description in a UML diagram.
52.08	Read an application specification and translate it into a working program.
52.09	Describe the characteristics of different types of application development (e.g., Agile development).
52.10	Compare and contrast different methodologies for application development (e.g., Scrum, XP, Crystal, FDD, and DSDM).
52.11	Describe different methods for deploying applications.
53.0	Use nullable values in a .NET program. – The student will be able to:
53.01	Describe the use of nullable value types.
53.02	Describe the use of the null value in .NET programs.
53.03	Write statements to declare and initialize nullable value types.
53.04	Write statements to determine if a nullable value type currently has a value.
54.0	Use the .NET String and StringBuilder classes in an application. – The student will be able to:
54.01	Compare and contrast the String and StringBuilder classes.
54.02	Identify the performance implications of using the String and StringBuilder classes for different purposes.

	54.03 Use the methods of the String class to compare, search, format, split and join strings.
	54.04 Use the methods of the String and StringBuilder classes to find, replace, delete, and insert substrings.
	54.05 Use the methods of the String class to translate a string into uppercase or lowercase.
	54.06 Use culture information to modify strings.
55.0	Use .NET classes to perform stream input/output. – The student will be able to:
	55.01 Compare and contrast .NET classes used to perform file input/output (e.g., StreamReader, StreamWriter, StringReader, StringWriter, MemoryStream, BinaryReader, BinaryWriter).
	55.02 Compare and constrast .NET classes used to manipulate files and directories (e.g., Directory, DirectoryInfo, File, FileInfo, Path).
	55.03 Use .NET classes to search, add, and delete directories.
	55.04 Use .NET classes to search, add, and delete files.
	55.05 Use .NET classes to read and write text to a file.
	55.06 Use .NET classes to read and write objects of a variety of types to a file.
	55.07 Use .NET classes to read and write binary data to a file.
	55.08 Compare and contrast .NET classes used to compress data (e.g., GZipStream, DeflateStream).
	55.09 Use .NET classes to read and write compressed data to a file.
56.0	Use recursive functions to solve problems in .NET programs. – The student will be able to:
	56.01 Describe the use of recursive methods in solving problems.
	56.02 Describe the difference of iterative and recursive methods.
	56.03 Demonstrate the use of direct recursion.
	56.04 Demonstrate the use of indirect recursion.
57.0	Write .NET programs that use interfaces. – The student will be able to:
	57.01 Describe interfaces and their use in .NET programming.
	57.02 Declare and use a class that implements a standard interface.
	57.03 Compare and contrast inheritance from a base class and inheritance of an interface.
	57.04 Identify common interfaces and their purposes (e.g., IComparable, IComparer, IEquatable, IDisposable, IFormattable, IConvertible).

	57.05 Define and use a custom interface.
	57.06 Write classes that implement common interfaces (e.g., IComparable, IComparer, IEquatable, IDisposable, IFormattable, IConvertible).
	57.07 Describe the program to interface principle and its benefits.
58.0	Use .NET collections in applications. – The student will be able to:
	58.01 Compare and contrast common non-generic collection classes, including ArrayList, BitArray, HashTable, Queue, and Stack.
	58.02 Write programs that use common non-generic collection classes.
	58.03 Compare and contrast non-generic collection classes to generic collection classes.
	58.04 Compare and contrast common generic collection classes, including Dictionary, LinkedList, Queue, SortedDictionary, SortedList, and Stack.
	58.05 Write programs that use common generic collection classes.
	58.06 Identify the collection class that is the best choice for different application requirements.
	58.07 Use iterators to access individual members of different types of collections.
	58.08 Use standard methods to add, delete, and modify members of different types of collections.
	58.09 Write statements to access members of a dictionary based on a key.
	58.10 Write statements to determine the existence of members of a dictionary based on a key or a value.
59.0	Demonstrate knowledge of different types of .NET applications. – The student will be able to:
	59.01 Compare and contrast different types of .NET applications (e.g., Console, Windows Form, WPF, Windows Service, Class Library, Web, and database).
	59.02 Choose the best type of application to develop for a given application scenario.
	59.03 Describe the characteristics and capabilities of a console application.
	59.04 Develop, test, and debug a console application.
	59.05 Write a console application that uses command-line arguments.
60.0	Demonstrate knowledge of .NET architecture and tools. – The student will be able to:
	60.01 Describe components of the .NET architecture, including the Common Language Runtime (CLR), just-in-time (JIT) compiler, intermediate language (IL).
	60.02 Describe the steps required for a managed assembly to be built and run in the .NET environment.

60.03	Compile single-file and multi-file assemblies using command-line tools.
60.04	Describe common command-line tools used in developing .NET applications (e.g., Al.exe, Caspol.exe, Ildasm.exe, Makecert.exe, Sn,exe, Gacutil.ext) and their purposes.
60.05	Use a signing tool to sign an assembly.
60.06	Use a disassembly tool to view the classes, members, and methods of an assembly.
60.07	Describe the garbage collection process.
61.0	Demonstrate knowledge of Web applications. – The student will be able to:
61.01	Describe the Web as a platform for applications.
61.02	Compare and contrast static and dynamic content.
61.03	Describe how Web pages are loaded to a computer from the Internet including the hardware, software, servers, and protocols required.
61.04	Compare and contrast server-side and client-side programming.
61.05	Describe how a Web browser downloads and renders a Web page.
61.06	Describe options and methodology for Web site deployment.
61.07	Compare and contrast different Web development technologies, including HTML, CSS, JavaScript, CGI scripts, XML, and ASP.NET.
61.08	Describe common Web page terminology (e.g., page life cycle, the Web page event model, Web Page state management, cookies, virtual directories).
61.09	Define the steps in the page life cycle of an ASP.NET Web page.
61.10	Describe state management as it related to maintenance of page information.
61.11	Describe how Web services are accessed from a client application.
61.12	Describe the PostBack mechanism for posting data to a Web page using ASP.NET.
61.13	Describe the role of Internet Information Services (IIS).
61.14	Describe the role of Internet Service Providers (ISP) and the services they provide.
61.15	Describe Web services and related tools (e.g., Extensible Markup Language (XML), Simple Object Access Protocol (SOAP) and Web Service Definition Language (WSDL)).
61.16	Describe the characteristics and purposes of Application objects and Session objects that are maintained by the ASP.NET run-time engine.
61.17	Describe the common ASP.NET events for applications and sessions (i.e., application start, application end, application error, session start, session end).
61.18	Describe entities that define standards for Internet applications (e.g., WS3, OASIS, WS-I).

62.0	Develop Web pages using HTML, CSS, JavaScript, and ASP.NET. – The student will be able to:
62.01	Describe the characteristics and capabilities of a Web application.
62.02	Develop Web pages using HTML (Hyper-text Markup Language) that include commonly used tags to define Web pages with hyperlinks, tables, text, headings, images, backgrounds, and frames.
62.03	Develop Web pages using CSS (cascading style sheets) to define a uniform appearance across multiple Web pages.
62.04	Develop Web pages using JavaScript to define and implement interactive content.
62.05	Define and use functions in JavaScript.
62.06	Define and use local and global variables using JavaScript.
62.07	Use conditional operators in JavaScript to selectively perform specific function.
62.08	Use Boolean conditions in JavaScript to selectively perform with multiple conditions.
62.09	Use JavaScript loops to perform iteration.
62.10	Use string objects and escape sequences in a JavaScript.
62.11	Use JavaScript to access, use, and modify HTML elements.
62.12	Use JavaScript to handle common events, including mouse events, key events, and page events.
62.13	Use JavaScript to create and manage forms within a Web page.
62.14	Develop Web pages that use ASP.NET to provide interactivity.
62.15	Describe standards for making Web pages accessible to individuals with disabilities.
62.16	Develop Web pages that conform to accessibility standards.
63.0	Develop .NET Windows Form applications. – The student will be able to:
63.01	Describe the characteristics and capabilities of a Windows Forms application.
63.02	Compare and contrast common objects used in Windows Forms applications (e.g., Button, CheckBox, ColorDialog, ComboBox, DateTimePicker, GroupBox, Label, LinkLabel, ListBox, MenuStrip, Panel, PicureBox, RadioButton, ToolTip).
63.03	Develop an interactive Windows Forms application that uses a variety of objects for input and output.
63.04	Perform data validation on input fields.
63.05	Describe the Windows Forms event model.
63.06	Create Windows Forms application that respond to common events, including mouse events, keyboard events, load events, click

	events, resize events, and drag events.
63.07	Define Windows Forms applications with graphical user interfaces (GUI) that conform to appropriate usability guidelines.
63.08	Create Windows Forms applications that use Multiple Document Interface (MDI) and Single Document Interface (SDI).
63.09	Describe visual inheritance.
63.10	Develop a Windows Forms application that inherits a form from a base application.
64.0	Develop Windows Service applications and class libraries. – The student will be able to:
64.01	Describe the characteristics and capabilities of a Windows Service application.
64.02	Describe the states in the lifetime of a service.
64.03	Describe the ServiceBase and ServiceController classes and their role in developing and controlling Windows Service applications.
64.04	Develop a Windows Service application.
64.05	Develop an installer for a Windows Service application.
64.06	Install and deploy a Windows Service application.
64.07	Test and debug a Windows Service application.
64.08	Uninstall a Windows Service application.
64.09	Develop, test, and debug a Class Library.
65.0	Demonstrate knowledge of database applications. – The student will be able to:
65.01	Explain common database terminology (e.g., relationships, normalization, fields, records, data integrity, referential integrity).
65.02	Describe the benefits and characteristics of relational databases.
65.03	Define primary keys and foreign keys and describe their purposes.
65.04	Explain how database design fits into the database application development process.
65.05	Translate an entity-relationship model into a relational database design.
65.06	Differentiate between one-to-one, one-to-many, and many-to-many relationships.
65.07	Move data from an unnormalized form through to a third normal form.
65.08	Based on information requirements, define database tables that ensure data integrity and reduce redundant data.
65.09	Describe routine maintenance for databases.

66.0	Demonstrate knowledge of structured query language (SQL) statements. – The student will be able to:
66.01	Describe the data manipulation language (DML) and describe various DML statements.
66.02	List the capabilities of SQL SELECT statements.
66.03	Write and execute a basic SELECT statement.
66.04	Write and execute SELECT statements using the WHERE clause with common operators (i.e., =, <>, >, <, >=, <=, BETWEEN, LIKE, IN).
66.05	Write and execute SELECT statements using the WHERE clause with logical operators, including AND and OR.
66.06	Write and execute SELECT statements using the ORDER BY clause.
66.07	Write and execute SELECT statements using wildcards.
66.08	Write and execute UPDATE statements to modify rows in a table.
66.09	Write and execute INSERT statements to insert rows into a table.
66.10	Write and execute DELETE statements to delete rows in a table.
66.11	Write and execute statements using JOIN to select data from two or more related tables.
66.12	Write and execute statements that use SQL to perform common calculations (e.g., AVG, MAX, MIN, SUM).
67.0	Develop .NET database applications. – The student will be able to:
67.01	Describe the purpose of ActiveX Data Objects (ADO).
67.02	Describe the purpose of the ADO connection object.
67.03	Write statements to connect to a database.
67.04	Write statements to open a database.
67.05	Write statements to create a recordset.
67.06	Write statements to commit a transaction to a database.
67.07	Write statements to rollback a transaction to a database.
67.08	Write statements to close a connection to a database.
67.09	Develop, test, and debug a database application.
67.10	Develop, test, and debug a WPF application.

68.0	Successfully work as a member of a software development team. – The student will be able to:
68.01	Accept responsibility for specific tasks in a given situation.
68.02	Document progress, and provide feedback on work accomplished in a timely manner.
68.03	Complete assigned tasks in a timely and professional manner.
68.04	Reassign responsibilities when the need arises.
68.05	Complete daily tasks as assigned on one's own initiative.
69.0	Manage time according to a plan. – The student will be able to:
69.01	Set realistic time frames and schedules.
69.02	Keep a written record of work accomplished on a daily basis.
69.03	Meet goals and objectives set by the team.
69.04	Identify individual priorities.
69.05	Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities, as needed.
70.0	Keep acceptable records of progress problems and solutions. – The student will be able to:
70.01	Develop and use a record keeping system to record daily progress.
70.02	Use a project journal to identify problem statement.
70.03	Develop a portfolio of work accomplished to include requirements documents, design documents and UML, project and test plans, and prototypes.
71.0	Plan, organize, and carry out a project plan. – The student will be able to:
71.01	Identify a substantive problem that can be addressed with a .NET software solution.
71.02	Identify and document the potential customers for the project.
71.03	Identify and document the customer requirements for the project including use case definitions.
71.04	Document the proposed user interface for the project using common tools (e.g., mockups, event planning documents).
71.05	Identify the hardware and software requirements for the project.
71.06	Identify the programming tools required to develop the project.
71.07	Write a detailed design document for the project.
71.08	Write a detailed test plan for the project that addresses varying levels of testing including system testing and usability testing.

	71.09 Determine the scope of a project.
	71.10 Organize the team according to individual strengths.
	71.11 Assign specific tasks within a team.
	71.12 Determine project priorities.
	71.13 Identify required resources to complete the project.
	71.14 Plan, research, design, develop, and evaluate activities, as required.
	71.15 Carry out the project plan to successful completion.
	71.16 Document design problems, test results, product defects, and resolutions.
72.0	Manage resources. – The student will be able to:
	72.01 Identify required resources for each stage of the project plan.
	72.02 Determine the methods needed to acquire needed resources.
	72.03 Demonstrate good judgment in the use of resources.
	72.04 Recycle and reuse resources where appropriate.
	72.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.
73.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:
	73.01 Identify the proper tool for a given job.
	73.02 Use tools and machines in a safe manner.
	73.03 Adhere to laboratory or job site safety rules and procedures.
	73.04 Identify the application of processes appropriate to the task at hand.
	73.05 Identify materials appropriate to their application.
74.0	Demonstrate an understanding of the software development process. – The student will be able to:
	74.01 State the goals of the software application clearly.
	74.02 Identify and write a plan to achieve each goal.
	74.03 Develop a list of materials and content required for each goal.
	74.04 Develop a step-by-step procedure for developing the application.
	74.05 Follow a written procedure.

	74.06 Record data from evaluation activities.
	74.07 Document conclusions and solutions based on evaluation results, observations and data.
	74.08 Document progress using a project log.
	74.09 Write an abstract describing the project plan.
75.0	Research content related to the project and document the results following industry conventions. – The student will be able to:
	75.01 Identify the basic research needed to develop the project plan.
	75.02 Identify available resources for completing background research required in the project plan.
	75.03 Demonstrate the ability to locate resource materials in a library, database, Internet and other research resources.
	75.04 Demonstrate the ability to organize information retrieval.
	75.05 Demonstrate the ability to prepare a topic outline.
	75.06 Write a draft of the research report.
	75.07 Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.
	75.08 Prepare an electronically composed research paper in proper form.
	75.09 Conduct an alpha and beta evaluation of the project's product.
	75.10 Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.
76.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:
	76.01 Prepare a multi-media presentation on the completed project.
	76.02 Make an oral presentation about the project using the multi-media materials.
	76.03 Review the presentation, and make changes in the delivery method(s) to improve presentation skills.
77.0	Demonstrate competency in the area of expertise related to developing computer software using the .NET framework. – The student will be able to:
	77.01 Demonstrate a mastery of the content of the selected subject area.
	77.02 Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.
	77.03 Demonstrate the ability to apply the knowledge, experience and skill developed in the previous program completion to the successful completion of this demonstration.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Web Application Development & Programming**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

PSAV	
Program Number	Y700500
CIP Number	0511020102
Grade Level	30, 31
Standard Length	1050 hours
Teacher Certification	BUS ED 1 @2 COMP SCI 6 COMP PROG 7 G
CTSO	Phi Beta Lambda BPA
SOC Codes (all applicable)	15-1151 – Computer User Support Specialists 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to the fundamentals of programming and software development; procedural and object-oriented programming; creating web-based applications, including testing, monitoring, debugging, documenting, and maintaining applications.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points, with OCPs A, B, and C.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	OTA0040	Information Technology Assistant	150 hours	15-1151
B	CTS0041	Computer Programmer Assistant	300 hours	15-1131
C	CTS0044	Computer Programmer	150 hours	15-1131
D	CTS0034	Web Programmer	450 hours	15-1131

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 14.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microprocessors and digital computers.
03.0 Demonstrate an understanding of operating systems.
04.0 Use technology to enhance the effectiveness of communication skills utilizing word processing applications.
05.0 Use technology to enhance communication skills utilizing presentation applications.
06.0 Use technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
07.0 Use technology to enhance communication skills utilizing electronic mail.
08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
11.0 Demonstrate competence in page design applicable to the WWW.
12.0 Develop an awareness of emerging technologies.
13.0 Develop awareness of computer languages and software applications.
14.0 Demonstrate comprehension and communication skills.
15.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.
16.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
17.0 Distinguish between iterative and non-iterative program control structures.
18.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
19.0 Describe the processes, methods, and conventions for software development and maintenance.
20.0 Explain the types, uses, and limitations of testing for ensuring quality control.
21.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
22.0 Describe information security risks, threats, and strategies associated with software development.
23.0 Design a computer program to meet specific physical, operational, and interaction criteria.
24.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
25.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
26.0 Create a unit test plan, implement the plan, and report the results of testing.
27.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
28.0 Solve problems using critical thinking skills, creativity and innovation.
29.0 Use information technology tools.
30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.

31.0 Describe the importance of professional ethics and legal responsibilities.
32.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
33.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
34.0 Design, document, and create object-oriented computer programs.
35.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
36.0 Demonstrate proficiency using HTML and XHTML to create web content.
37.0 Demonstrate proficiency using cascading style sheets (CSS) to format web pages.
38.0 Demonstrate proficiency using basic client-side scripting to control the content and the behavior of HTML and XHTML documents.
39.0 Demonstrate an understanding of JavaScript programming fundamentals.
40.0 Demonstrate proficiency in assigning and handling variables in JavaScript programs and functions.
41.0 Use event handlers in JavaScript programs and functions.
42.0 Recognize and assign data types appropriate to their use.
43.0 Demonstrate proficiency in using appropriate operators to achieve a planned output.
44.0 Write executable statements.
45.0 Demonstrate an understanding of variable scope.
46.0 Use good programming practices.
47.0 Demonstrate use of the Document Object Module (DOM).
48.0 Use conditional control statements in JavaScript.
49.0 Use iterative control statements in JavaScript.
50.0 Use nested loop iterative control statements in JavaScript.
51.0 Use JavaScript to produce input and output for programs.
52.0 Demonstrate proficiency in using Form Objects in JavaScript programs and functions.
53.0 Demonstrate proficiency in using methods in JavaScript programs and functions.
54.0 Demonstrate proficiency in using parameters in JavaScript programs and functions.
55.0 Utilize debugging techniques in programs.
56.0 Recognize security risks in programs.
57.0 Use plug-ins and libraries.
58.0 Demonstrate proficiency in programming for mobile delivery technology (e.g., iPhone/Android).
59.0 Demonstrate an understanding of Personal Home Page (PHP) programming language.
60.0 Demonstrate proficiency in PHP configuration.
61.0 Demonstrate an understanding of PHP language basics.
62.0 Demonstrate proficiency in the use of server processes.
63.0 Demonstrate an understanding of object-oriented programming in PHP.
64.0 Demonstrate proficiency in writing PHP code to handle file input/output (I/O) operations.
65.0 Demonstrate proficiency in creating, populating, and using arrays in PHP.
66.0 Demonstrate proficiency handling strings in PHP.
67.0 Demonstrate proficiency in using PHP to access databases via Open Database Connectivity (ODBC).
68.0 Demonstrate proficiency in applying best practices for ensuring creation of a secure program.
69.0 Demonstrate an understanding of key technologies, protocols, and architectures associated with web development and programming.

Florida Department of Education
Student Performance Standards

Program Title: **Web Application Development & Programming**
PSAV Number: **Y700500**

Course Number: OTA0040
Occupational Completion Point: A
Information Technology Assistant – 150 Hours – SOC Code 15-1151

Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 14.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040) - (RTF)

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
15.0	Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:
15.01	Describe the evolution of programming and programming careers.
15.02	Identify tasks performed by programmers.
15.03	Describe how businesses use computer programming to solve business problems.
15.04	Investigate job opportunities in the programming field.
15.05	Explain different specializations and the related training in the computer programming field.
15.06	Explain the need for continuing education and training of computer programmers.
15.07	Explain enterprise software systems and how they impact business.
15.08	Describe ethical responsibilities of computer programmers.
15.09	Describe the role of customer support to software program quality.
15.10	Identify credentials and certifications that may improve employability for a computer programmer.
15.11	Identify devices, tools, and other environments for which programmers may develop software.
16.0	Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:
16.01	Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.
16.02	Explain the types and uses of variables in programs.
16.03	Determine the best data type to use for given programming problems.
16.04	Identify the types of operations that can be performed on different data types.
16.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.
16.06	Explain how computers store different data types in memory.
16.07	Demonstrate the difference between "data" and "information".
16.08	Use different number systems to represent data.
16.09	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.

	16.10 Use Boolean logic to perform logical operations.
17.0	Distinguish between iterative and non-iterative program control structures. – The student will be able to:
	17.01 Explain non-iterative programming structures (e.g., if, if/else) and their uses.
	17.02 Explain iterative programming structures (e.g., while, do/while) and their uses.
18.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:
	18.01 Identify the characteristics, uses, and limits of low-level programming languages.
	18.02 Identify the characteristics, uses, and limits of high-level programming languages.
	18.03 Identify the characteristics, uses, and limits of rapid development programming languages.
	18.04 Describe object-oriented concepts.
	18.05 Explain the characteristics of procedural and object-oriented programming languages.
	18.06 Compare and contrast programming languages that are compiled (e.g., C++), interpreted (e.g., Basic, HTML), and translated (e.g., Java).
19.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:
	19.01 Describe and explain tools used in software development.
	19.02 Describe the stages of the program life cycle.
	19.03 Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).
	19.04 List and explain the steps in the program development cycle.
	19.05 Describe different types of documentation used in the program development cycle (e.g., requirements document, program design documents, test plans).
	19.06 Describe the on-going need for program maintenance.
	19.07 Describe different methods companies use to facilitate program updates for enhancements and defects (e.g., how customers receive patches, updates, new versions, upgrades).
	19.08 Describe different methods used to facilitate version control and change management.
20.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:
	20.01 Explain the uses and limits of testing in ensuring program quality.
	20.02 Explain testing performed at different stages of the program development cycle (e.g. unit testing, system testing, user acceptance testing).

	20.03 Describe data and the use of test plans/scripts to be used in program testing.
	20.04 Describe and identify types of programming errors (e.g., syntactical, logic, usability, requirements mismatch).
	20.05 Identify the data to be used for boundary conditions.
	20.06 Explain different types of testing (e.g., usability, automated, regression) and testing tools.
21.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:
	21.01 Describe different design methodologies and their uses (e.g., object-oriented design, structured design, and rapid application development).
	21.02 Describe tools for developing a program design (e.g., UML, flowcharts, design documents, pseudocode).
	21.03 Explain the role of existing libraries and packages in facilitating programmer productivity.
	21.04 Participate and contribute to a design review of a program design developed using a common program design tool (e.g., UML, flowcharts, design documents, pseudocode).
	21.05 Write a program design document using UML or other standard design methodology.
	21.06 Define input and output for a program module using UML or other standard design methodology.
22.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:
	22.01 Explain the security risks to personal and business computer users.
	22.02 Identify different types of threats to computer systems.
	22.03 Identify methods to protect against different threats to computer systems.
	22.04 Understand the importance of a disaster/emergency response plan.
	22.05 Identify alternative methods for data storage and backup (e.g., mirroring, fail-over, high availability, types of backups).
23.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:
	23.01 Choose appropriate data types depending on the needs of the program.
	23.02 Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).
	23.03 Design and develop program that are designed for efficiency (e.g., less memory usage, less inputs/outputs, faster processing).
	23.04 Identify the software environment required for a program to run (e.g., operating system required, mobile, Web-based, desktop, delivery method).

	23.05 Identify the tools required to develop a program (e.g., editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).
24.0	Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types. – The student will be able to:
	24.01 Use appropriate naming conventions to define program variables and modules (methods, functions).
	24.02 Use a program editor to write the source code for a program.
	24.03 Write programs that use selection structures (e.g., if, if/else).
	24.04 Write programs that use repetition structures (e.g., while, do/while).
	24.05 Write programs that use nested structures.
	24.06 Use internal documentation (e.g., single-line and multi-line comments, program headers, module descriptions, and meaningful variable and function/module names) to document a program according to accepted standards.
	24.07 Compile and run programs.
	24.08 Write programs that use standard arithmetic operators with different numerical data types.
	24.09 Write programs that use standard logic operators.
	24.10 Write programs that use a variety of common data types.
	24.11 Write programs that perform data conversion between standard data types.
	24.12 Write programs that define, use, search, and sort arrays.
	24.13 Write programs that use user-defined data types.
	24.14 Demonstrate understanding and use of appropriate variable scope.
25.0	Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input. – The student will be able to:
	25.01 Write programs that perform user input and output.
	25.02 Write programs that validate user input (e.g., range checking, data formats, valid/invalid characters).
	25.03 Write program modules such as functions, subroutines, or methods.
	25.04 Write program modules that accept arguments.
	25.05 Write program modules that return values.
	25.06 Write program modules that validate arguments and return error codes.

	25.07 Write interactive programs.
	25.08 Write programs that use standard libraries to enhance program function.
	25.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
26.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	26.01 Write a unit test plan that identifies the input data and expected results for program tests.
	26.02 Test and debug programs, including programs written by others.
	26.03 Write a test report that identifies the results of testing.
	26.04 Trace through the function of a program to ensure valid operation.
	26.05 Identify the system resources used by the program (e.g., memory, disk space, execution time, external devices).
	26.06 Create a disaster / emergency response plan for a computer system.
27.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	27.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	27.02 Locate, organize and reference written information from various sources.
	27.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	27.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	27.05 Apply active listening skills to obtain and clarify information.
	27.06 Develop and interpret tables and charts to support written and oral communications.
	27.07 Exhibit public relations skills that aid in achieving customer satisfaction.
28.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	28.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	28.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	28.03 Identify and document workplace performance goals and monitor progress toward those goals.

	28.04 Conduct technical research to gather information necessary for decision-making.
29.0	Use information technology tools. – The student will be able to:
	29.01 Use personal information management (PIM) applications to increase workplace efficiency.
	29.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	29.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	29.04 Employ collaborative/groupware applications to facilitate group work.
30.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	30.01 Employ leadership skills to accomplish organizational goals and objectives.
	30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	30.03 Conduct and participate in meetings to accomplish work tasks.
31.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	31.01 Evaluate and justify decisions based on ethical reasoning.
	31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.

Course Number: CTS0044 **Occupational Completion Point: C** **Computer Programmer – 150 Hours – SOC Code 15-1131**	
32.0	Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:
32.01	Demonstrate the understanding and use of classes, objects, attributes, and behaviors.
32.02	Demonstrate the understanding and use of inheritance.
32.03	Demonstrate the understanding and use of data encapsulation.
32.04	Demonstrate the understanding and use of polymorphism.
33.0	Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements. – The student will be able to:
33.01	Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.
33.02	Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.
33.03	Design an object-oriented program using UML or another standard design methodology.
33.04	Work with other team members to develop a project plan for a program.
33.05	Work with other team members to write a design document for a program with multiple functions and shared data.
33.06	Participate in design meetings that review program design documents for conformance to program requirements.
33.07	Estimate the time to develop a program or module.
34.0	Design, document, and create object-oriented computer programs. – The student will be able to:
34.01	Compare and contrast recursive functions to other iterative methods.
34.02	Understand the implementation of character strings in the programming language.
34.03	Write programs that perform string processing (e.g., string manipulation, string compares, concatenation).
34.04	Write programs that use user-defined data types.
34.05	Write object-oriented programs that use inheritance.
34.06	Write object-oriented programs that use polymorphism.
34.07	Develop class constructors.

	34.08	Write programs that define and use program constants.
	34.09	Write programs that perform error handling.
	34.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.
	34.11	Write programs that perform dynamic memory allocation.
	34.12	Write programs that perform effective management of dynamically allocated memory.
	34.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal and external) related to version control.
	34.14	Write programs that use complex data structures (e.g., stacks, queues, trees, linked lists).
	34.15	Write programs that are event-driven.
	34.16	Write programs that perform file input and output (i.e., sequential and random access file input/output).
	34.17	Perform basic database commands including connect, open, select, and close.
35.0	Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results. – The student will be able to:	
	35.01	Develop a test plan for an object-oriented program.
	35.02	Write test plans for event-driven programs.
	35.03	Write test plans for programs that perform file input and output.
	35.04	Perform test and debug activities on object-oriented programs, including those written by someone else.
	35.05	Perform test and debug activities on an event-driven program.
	35.06	Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.
	35.07	Document the findings of testing in a test report.

Course Number: CTS0034 **Occupational Completion Point – D** **Web Programmer – 450 Hours – SOC Code 15-1131**	
36.0	Demonstrate proficiency using HTML and XHTML to create web content. — The student will be able to:
36.01	Use storyboarding techniques for designing a Web site (e.g., linear, hierarchical).
36.02	Identify elements of a Web page.
36.03	Create Web pages using HTML and XHTML tags that create basic elements (e.g., links, lists, formatted text, tables).
36.04	Create Web pages that utilize tables to achieve complex layout.
36.05	Add graphic content to Web pages.
36.06	Create Web pages that utilize client-side image maps.
36.07	Develop, integrate, and apply the use of forms in Web site design.
36.08	Optimize Web content for desirable search engine placement.
36.09	Demonstrate an understanding of browser compatibility issues by designing pages that comply with the current Web Content Accessibility Guidelines issued by the World Wide Web Consortium (W3C).
36.10	Demonstrate an understanding of Web accessibility issues by developing pages that meet Bobby accessibility checker criteria.
36.11	Explain basic XML syntax and how XHTML conforms to the XML standard.
36.12	Use a WYSIWYG editor to develop and manage a Web site.
36.13	Use markup validation tools to test HTML and XHTML documents for well-formed elements and make all corrections necessary to ensure compliance with W3C standards.
36.14	Analyze and modify HTML and XHTML source code developed by others.
37.0	Demonstrate proficiency using cascading style sheets (CSS) to format web pages. – The student will be able to: Explain the advantages and disadvantages of using Cascading Style Sheets (CSS) to format Web pages.
37.01	Describe the difference between linked, embedded, imported and inline styles and explain how styles are inherited.
37.02	Explain the difference between classes, id, and span elements.
37.03	Utilize CSS properties within Web pages to control page layout, fonts, colors, backgrounds, and other presentation effects.
37.04	Demonstrate understanding of the Box Model.
37.05	Demonstrate proficiency in creating 1 to 3 column layouts.
37.06	Create navigation system through CSS.

38.0	Demonstrate proficiency using basic client-side scripting to control the content and the behavior of HTML and XHTML documents. – The student will be able to:
	38.01 Describe the difference between server-side and client-side processing.
	38.02 Describe the term “scripting language” and explain how scripting languages differ from compiled languages.
	38.03 Create web pages that employ client-side scripting to control content and display.
39.0	Demonstrate an understanding of JavaScript programming fundamentals. – The student will be able to:
	39.01 Describe server side versus client side applications including interpreters.
	39.02 Describe the purpose and use of an interpreter in relation to JavaScript.
	39.03 Describe differences in different types of JavaScript implementations (i.e., Jscript, ECMA).
	39.04 Declare and initialize variables.
	39.05 Assign new values to variables.
	39.06 Create and use constant variables.
	39.07 Describe the difference of programming languages versus scripting languages.
	39.08 Describe object based nature and platform independence.
	39.09 Describe and demonstrate inline scripting.
40.0	Demonstrate proficiency in assigning and handling variables in JavaScript programs and functions. – The student will be able to:
	40.01 Describe how variables are used in programs.
	40.02 Identify which data type should be used for a given value.
	40.03 Identify the syntax for using variables.
	40.04 Declare and initialize variables.
	40.05 Assign new values to variables.
	40.06 Create and use constant variables.
	40.07 Describe and demonstrate the use of properties.
	40.08 Describe identifiers and identify valid and invalid identifiers.
	40.09 Describe and identify reserved words, delimiters, literals, and comments.

41.0	Use event handlers in JavaScript programs and functions. – The student will be able to:
	41.01 Describe the event model and five events (form, image, map, link, and window).
	41.02 Demonstrate and use the window events load, focus, blur, and unload.
	41.03 Demonstrate and use the form events change, reset, and submit.
	41.04 Demonstrate and use the text events cut, paste, select, and copy.
	41.05 Demonstrate and use the mouse events mousemove, mousedown, click, mousewheel, mouseover, mouseout and mouseover.
	41.06 Demonstrate and use the keyboard events keyup, keydown, keypress.
	41.07 Demonstrate using the appropriate event handlers with their associated events.
42.0	Recognize and assign data types appropriate to their use. – The student will be able to:
	42.01 Describe the data type categories.
	42.02 Give examples of var, primitives, null, and undefined data types.
	42.03 Demonstrate the use of var in relation to other datatypes.
43.0	Demonstrate proficiency in using appropriate operators to achieve a planned output. – The student will be able to:
	43.01 Construct statements using arithmetic operators.
	43.02 Construct statements using relational operators.
	43.03 Construct and use statements using logical operators.
	43.04 Construct and use statements using string concatenation, and strict comparison.
	43.05 Construct and use statements using assignment operators.
	43.06 Construct and execute statements using operator precedence.
44.0	Write executable statements. – The student will be able to:
	44.01 Construct variable assignment statements.
	44.02 Construct statements using built-in functions.
	44.03 Describe when implicit data type conversions take place.

	44.04 List the drawbacks of implicit data type conversions.
	44.05 Construct statements using functions to explicitly convert data types.
45.0	Demonstrate an understanding of variable scope. – The student will be able to:
	45.01 Understand the scope and visibility of variables.
	45.02 Write programs using local variables.
	45.03 Describe the scope of a variable.
46.0	Use good programming practices. – The student will be able to:
	46.01 List examples of good programming practices.
	46.02 Insert comments into code.
	46.03 Demonstrate the use of <no script> tag.
	46.04 Follow formatting guidelines when writing code.
	46.05 Understand the different types of errors produced by programs.
47.0	Demonstrate use of the Document Object Module (DOM). – The student will be able to:
	47.01 Create and use user defined objects.
	47.02 Create user defined objects with properties and methods.
	47.03 Describe and Use the Array Object including its parameters, properties, and methods (chop, join, pop, push, splice, split).
	47.04 Describe and Use the Date Object including its multiple constructors, properties, and methods (getDay, getMonth, getYear, getMinutes, getHous, getTime).
	47.05 Describe and use the Window Object including \properties, and methods.
	47.06 Describe and use the Image Object including its properties, and methods.
	47.07 Describe and use the History Object including its properties, and methods.
	47.08 Describe and use the RegEx Object for basic and complex regular expressions.
	47.09 Describe and use the String Object including its properties, and methods.
	47.10 Describe and use the Math Object including its properties, and methods.

48.0	Use conditional control statements in JavaScript. – The student will be able to:
	48.01 Construct and use an if statement.
	48.02 Construct and use a switch statement.
	48.03 Construct and use a while, do while, and for loop.
	48.04 Construct and use a conditional operator.
49.0	Use iterative control statements in JavaScript. – The student will be able to:
	49.01 Describe the types of loop statements and their uses.
	49.02 Construct and use the while and do while loop.
	49.03 Construct and use the for loop.
	49.04 Describe when a while loop is used.
	49.05 Describe when a for loop is used.
50.0	Use nested loop iterative control statements in JavaScript. – The student will be able to:
	50.01 Construct and execute a program using nested loops.
	50.02 Construct and execute a loop using break and continue.
	50.03 Evaluate a nested loop construct and sentinel value.
51.0	Use JavaScript to produce input and output for programs. – The student will be able to:
	51.01 Describe and use the prompt() and confirm() to input data into programs.
	51.02 Describe and demonstrate the use of the alert() to produce output to the console.
	51.03 Describe and demonstrate how to input data using JavaScript Events.
	51.04 Describe and demonstrate how to output using the document.write().
	51.05 Explain the difference of prompt() and confirm() functions.
	51.06 Create and use escape sequences.

52.0	Demonstrate proficiency in using Form Objects in JavaScript programs and functions. – The student will be able to:
52.01	Use Form objects to validate input.
52.02	Access the value of the form object through its associated method.
52.03	Describe and use button, checkbox, textarea, select, radio, hidden, and text objects.
52.04	Access and modify values and attributes at runtime using getElementbyId, getElementsbyName, getElementsbyTagName, and inner HTML.
53.0	Demonstrate proficiency in using methods in JavaScript programs and functions. – The student will be able to:
53.01	Differentiate between anonymous methods and methods.
53.02	Identify the benefits of using methods.
53.03	Describe and use inner method.
53.04	Create a method.
53.05	Describe how a method is invoked.
54.0	Demonstrate proficiency in using parameters in JavaScript programs and functions. – The student will be able to:
54.01	Describe how parameters are passed into functions.
54.02	Define a parameter.
54.03	Create a method using a parameter.
54.04	Invoke a method that has parameters.
54.05	Distinguish between formal and actual parameters.
55.0	Utilize debugging techniques in programs. – The student will be able to:
55.01	Use the display property to enable/disable code blocks.
55.02	Use document.write() to log program execution.
55.03	Test program in different browsers and mobile devices for compatibility errors.
55.04	Use comments as a flow control while debugging.

56.0	Recognize security risks in programs. – The student will be able to:
56.01	Describe the security risk of cookies and browsers.
56.02	Identify security responsibilities of browsers and operating system.
56.03	Describe security systems such as frame to frame URL changing.
56.04	Describe the use of signed scripts.
56.05	Create and use cookies in a secure manner.
57.0	Use plug-ins and libraries. – The student will be able to:
57.01	Use external libraries in the program.
57.02	Describe and contrast the following industry libraries JQuerry, Dojo, LightBox, and Moo Tools, PhoneGap.
57.03	Describe different types of libraries full, effects, tools, graphing, math, cryptography, and AJAX.
57.04	Identify how load and reference external and user made scripts.
57.05	Describe AJAX elements and procedures.
57.06	Describe XML.
57.07	Demonstrate the use of XMLHttpRequest to retrieve data.
58.0	Demonstrate proficiency in programming for mobile delivery technology (e.g., iPhone/Android). – The student will be able to:
58.01	Respond to multi-touch and gesture events.
58.02	Describe and demonstrate the use of webkit CSS.
58.03	Use the meta tag to enable native look and feel.
58.04	Create a splash screen.
58.05	Describe and demonstrate app caching.
58.06	Describe and demonstrate use of JQuery for mobile development.
58.07	Describe how to publish the app using XCode.

59.0	Demonstrate an understanding of Personal Home Page (PHP) programming language. – The student will be able to:
59.01	Describe the evolution of PHP as a programming language.
59.02	Discuss the strengths and limitations of PHP.
60.0	Demonstrate proficiency in PHP configuration. – The student will be able to:
60.01	Set up a PHP host (wamp, mamp, online).
60.02	Configure PHP for File Transfer Protocol (FTP) access.
60.03	Configure the config.php file.
61.0	Demonstrate an understanding of PHP language basics. – The student will be able to:
61.01	Describe how variables are declared, referenced, and passed.
61.02	Describe the control structures inherent with PHP programming.
61.03	Describe the three types of arrays used in PHP.
61.04	Describe how functions in PHP are created, called, and controlled.
62.0	Demonstrate proficiency in the use of server processes. – The student will be able to:
62.01	Describe a session and explain its importance and use in web programming.
62.02	Describe the server processes associated with forms handling.
62.03	Compare and contrast the use of GET and POST.
62.04	Describe cookies and explain their use, population, control, and risks.
62.05	Describe HTTP Headers and their role in web development.
62.06	Describe HTTP Authentication.
63.0	Demonstrate an understanding of object-oriented programming in PHP. – The student will be able to:
63.01	Create classes using PHP.
63.02	Describe inheritance and its role in PHP programming.
63.03	Write PHP code to handle exceptions.
63.04	Write PHP code to accommodate different interfaces.

64.0	Demonstrate proficiency in writing PHP code to handle file input/output (I/O) operations. – The student will be able to:
64.01	Write PHP code to perform open, read, and write operations on files.
64.02	Write PHP code to initiate file system functions.
64.03	Write PHP code to handle streams.
65.0	Demonstrate proficiency in creating, populating, and using arrays in PHP. – The student will be able to:
65.01	Create, populate and write code to extract information from a numeric array in PHP.
65.02	Create, populate and write code to extract information from an associative array in PHP.
65.03	Create, populate and write code to extract information from a multidimensional array in PHP.
66.0	Demonstrate proficiency handling strings in PHP. – The student will be able to:
66.01	Write PHP code to retrieve or extract one or more characters from a string.
66.02	Write PHP code to convert a string from data type to another.
66.03	Write PHP code to manipulate the display characteristics of string data.
66.04	Write PHP code that uses string date to control program flow.
66.05	Write PHP code to join array elements with a string.
67.0	Demonstrate proficiency in using PHP to access databases via Open Database Connectivity (ODBC). – The student will be able to:
67.01	Write PHP code to create an ODBC connection and retrieve information from a database using the appropriate Structured Query Language (SQL) statement.
67.02	Describe a prepared statement and discuss its primary advantages (e.g., code efficiency, SQL Injection prevention).
67.03	Create a prepared statement to perform specific SQL actions.
67.04	Describe a PHP Data Object (PDO) transaction and explain its primary advantages.
67.05	Create a prepared statement and associated result set using PDOStatement.
68.0	Demonstrate proficiency in applying best practices for ensuring creation of a secure program. – The student will be able to:
68.01	Describe an SQL Injection, its consequences, and ways in which it may be prevented via programming.
68.02	Describe the Remote Code Injection vulnerability in PHP and ways in which it may be prevented.

	68.03 Describe the risk of session hijacking in PHP and ways to program around it.
	68.04 Describe the risks associated with uploading files in PHP and ways in which risks might be mitigated.
	68.05 Describe Secure Sockets Layer (SSL) and usage issues related to PHP.
69.0	Demonstrate an understanding of key technologies, protocols, and architectures associated with web development and programming. – The student will be able to:
	69.01 SimpleXML functions.
	69.02 Extensible Markup Language (XML) Extension.
	69.03 XML Path Language (Xpath).
	69.04 Web Services.
	69.05 Simple Object Access Protocol (SOAP).
	69.06 Representational State Transfer (REST).
	69.07 JavaScript Object Notation (JSON).
	69.08 Asynchronous JavaScript and XML (AJAX).

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan

with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:
http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml