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 15-1132.00 Software Developers, Applications 15-1131.00 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 one credit of the Business Technology Education core, including Computing for College and Careers (8209020) or Introduction to 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	9005210	Modeling and Simulation Foundations **Or**	1 credit	15-1199	2	VO
BTE Core	8200320 8200330	Applied Computer Business Skills I **And** Applied Computer Business Skills II **OR**	.5 credit .5 credit		2 2	VO
	8209020	Computing for College and Careers **OR**	1 credit		2	VO
	8207310	Introduction to Information Technology	1 credit		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	Genetics Honors	Integrated Science 1	Marine Science 1 Honors	Physical Science	Physics 1	Environmental Science
9005210	#	5/80 6%	9/83 11%	3/69 4%	4/67 6%	2/69 3%	9/82 11%	17/66 26%	4/74 35%	3/72 4%	19/70 27%
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%
9005220	#	#	#	#	#	#	#	#	#	#	#
9005230	20/87 23%	25/80 31%	1/83 1%	22/69 32%	4/67 6%	21/69 30%	3/82 4%	18/66 27%	5/74 7%	26/72 36%	22/70 31%
9005240	19/87 22%	19/80 24%	#	19/69 28%	#	19/69 28%	#	14/66 21%	#	20/72 28%	19/70 27%

*** 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
9005210	14/67 21%	8/75 11%	14/54 26%	9/46 20%	9/45 20%	#	#
8207310	20/67 30%	15/75 20%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	40/45 89%
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.

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 an understanding of essential modeling and simulation terms by using them as they relate to specific careers requiring modeling and simulation skills and knowledge.
05.0 Demonstrate information fluency using emerging research techniques and technology.
06.0 Demonstrate a knowledge of the information technology industry, the history of computers including their components and functionality, as they relate to Modeling and Simulation.
07.0 Explain intelligent systems as they relate to modeling, simulation and data analysis.
08.0 Develop an understanding of programming languages as they relate to modeling and simulation.
09.0 Demonstrate knowledge of different operating systems.
10.0 Explore software evolution and lifecycle as it relates to modeling and simulation.
11.0 Demonstrate an understanding of visual modeling in relation to the production process.
12.0 Understand the role of texture artists in relation to the production process.
13.0 Demonstrate knowledge of basic materials and textures.
14.0 Demonstrate knowledge of basic lighting.
15.0 Explain visual simulation.
16.0 Explain distributed simulation.
17.0 Explain environmental models.
18.0 Use visual modeling techniques and software to create an environmental model.

For competencies associated with the BTE Core visit the following link: The BTE Core includes the Technical Competencies of the first OCP A of this program.

19.0 Understand the production process of modeling, simulation and entertainment.
20.0 Demonstrate knowledge of basic animation.
21.0 Demonstrate knowledge of basic 3D rendering.
22.0 Demonstrate basic understanding of modeling principles.
23.0 Analyze model fidelity as related to modeling and simulation techniques.
24.0 Explain object models.
25.0 Demonstrate an understanding of mathematical modeling in relation to the production process.
26.0 Explain agent-based simulation.
27.0 Demonstrate knowledge of photo editing software.
28.0 Demonstrate knowledge of video editing software.
29.0 Incorporate audio assets into a modeling and simulation engine.

30.0 Utilize basic audio production techniques, sound construction, and editing techniques as related to modeling and simulation.
31.0 Apply industry standards for 3D animation software and user interface to create 3D basic and complex models.
32.0 Demonstrate knowledge of rigging.
33.0 Demonstrate knowledge of basic character setup.
34.0 Demonstrate knowledge of motion capture systems.
35.0 Use the production process and relevant modeling and simulation techniques and software to design simple 3D simulation.
36.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Modeling and Simulation.
37.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Modeling and Simulation.
38.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Modeling and Simulation.
39.0 Demonstrate proficiency using various software applications while understanding the hardware requirements needed for modeling and simulations including processors, input/output (I/O) devices.
40.0 Build a simple scenario for experimentation or training.
41.0 Demonstrate an understanding of underlying principles of experimental simulation and how it relates to modeling and simulation.
42.0 Demonstrate an understanding of 3D modeling and simulation software engines.
43.0 Understand systems engineering for simulators.
44.0 Use real time technology to model and simulate environments.
45.0 Demonstrate an understanding of underlying principles of numerical analysis and how it relates to modeling and simulation.
46.0 Analyze numerical characteristics of univariate data sets to describe patterns and departure from patterns, using statistics for various distributions.
47.0 Use probabilities (relative frequency and theoretical), to plan and conduct an experiment that will address control, randomization and measurement of experimental error.
48.0 Use programming to develop modeling and simulation applications.
49.0 Test programs related to modeling and simulation.
50.0 Perform program maintenance to troubleshoot and optimize code.
51.0 Plan program design using object oriented programming (OOP) for modeling and simulation.
52.0 Demonstrate knowledge of non-uniform rational b-splines (NURBS) modeling.
53.0 Demonstrate knowledge of polygon modeling.
54.0 Demonstrate knowledge of animation principles as it relates to the underlying physics of modeling.
55.0 Use the production process and relevant modeling and simulation techniques and software to render a complex 3D simulation.
56.0 Explain and utilize project management and logistics to create and develop 3D modeling and simulation products.
57.0 Understand the implications of intellectual property rights, copyright laws and plagiarism on creative assets.
58.0 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.
59.0 Use innovative technologies to create prototypes of models.
60.0 Create and design vector or bitmap art reference to develop a 3D modeling texture map to build a model for simulation.
61.0 Demonstrate the use of experimental and engineering design techniques to produce real world or industry simulations.
62.0 Demonstrate an understanding of underlying principles of discreet event simulation and how it relates to modeling and simulation.
63.0 Implement multimedia programming as it relates to modeling and simulation using a gaming engine.
64.0 Use innovative technologies to create prototypes of models.

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,	

Florida Standards			Correlation to CTE Program Standard #
		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 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	

Florida Standards			Correlation to CTE Program Standard #
	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 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.	

Florida Standards	Correlation to CTE Program Standard #
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:
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
04.0 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,	
04.01 Define and explain essential modeling and simulation terms and concepts.		
04.02 Identify disciplines which use modeling and simulation tools and discuss their real world applications.		
04.03 Identify modeling and simulation related careers and the educational and professional requirements for various fields.		
04.04 Compare and contrast the central modeling and simulation concepts and careers.		
04.05 Explain the past, present, and future importance of modeling and simulation.		
05.0 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	
05.01 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.).		
05.02 Analyze internet safety issues and practice procedures for complying with acceptable use standards.		
05.03 Use technology tools to collaborate and generate a deliverable product.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
05.04	Develop and display an electronic portfolio.		
05.05	Demonstrate research skills using browsers, search engines, directories, and databases.		
05.06	Create and evaluate a list of materials found online for relevance, appropriateness and bias.		
05.07	Create and communicate a multimedia presentation, including text, sound, and graphics as related to modeling and simulation concepts.		
05.08	Demonstrate proficiency using search engines (e.g., Yahoo!, Google, Northern Light, Lycos, Excite, Bing.).		
05.09	Identify effective Boolean search strategies.		
05.10	Correlate the use of social media in the field of modeling and simulation for a variety of purposes.		
05.11	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, pdf).		
06.0	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
06.01	Explain how information technology and modeling and simulation impact the operation and management of business and society.		
06.02	Explain the emergence of e-commerce and e-government and the potential impact on business and society.		
06.03	Trace the evolution of the Internet from its inception to the present and into the future.		
06.04	Analyze physical models and organize them conceptually based on their development and historical relevance.		
06.05	Use graphic technology to create a visualization of a historic simulator or synthetic environment that has evolved over time.		
06.06	Describe the evolution of the digital computer as it relates to modeling and simulation.		
06.07	Explain the need for and use of input devices and displays to design and create models and simulations.		
06.08	Demonstrate an understanding of storage management (e.g., hard drive, floppy disk) as it relates to creating and storing digital models and simulations.		
06.09	Identify the advantages and limitations of computer-generated models and simulation.		
07.0	Explain intelligent systems as they relate to modeling, simulation and data analysis. The student will be able to:		
07.01	Define intelligent system.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	07.02 Explain and examine structured logic and semantics.		
	07.03 Explain the use of intelligent systems.		
	07.04 Examine programs using the elements of an intelligent system.		
08.0	Develop an understanding of programming languages as they relate to modeling and simulation. The student will be able to:		
	08.01 Explain the history of programming languages.		
	08.02 Explain how compilers work.		
	08.03 Identify the three types of programming design approaches (e.g., top-down, structured and object-oriented).		
09.0	Demonstrate knowledge of different operating systems. The student will be able to:		
	09.01 Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).		
	09.02 Discuss the impact of RAM and ROM technology on the development of the modern computer operating systems and microcomputers.		
	09.03 Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).		
	09.04 Identify the internal components of a computer (e.g., power supply, hard drive, mother board, input/output (I/O) cards/ports, cabling)..		
	09.05 Identify the different control systems for simulations		
	09.06 Explain the factors that can limit the simulation capabilities of personal computers.		
10.0	Explore software evolution and lifecycle as it relates to modeling and simulation. The student will be able to:		
	10.01 Explain software and hardware lifecycles and their steps.		
	10.02 Demonstrate an understanding of the basic concepts of computer maintenance, upgrades and life cycles.		SC. 912.N.3.5
11.0	Demonstrate an understanding of visual modeling in relation to the production process. The student will be able to:		
	11.01 Explain visual modeling as a process.		
	11.02 Explain the role of a modeler in visual modeling.		
	11.03 Identify job titles associated with visual modeling.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	11.04 Explain the modeling production pipeline as it relates to visual modeling.		
12.0	Understand the role of texture artists in relation to the production process. The student will be able to:		
	12.01 Define texturing as a process.		
	12.02 Define the role of texture artist.		
	12.03 Identify job titles associated with texture artist.		
	12.04 Identify texture creation in the production pipeline.		
	12.05 Demonstrate knowledge of the difference between textures and shades.		
13.0	Demonstrate knowledge of basic materials and textures. The student will be able to:		
	13.01 Demonstrate an understanding of material and texture storage.		
	13.02 Apply textures to an object.		
	13.03 Demonstrate an understanding of procedural shaders.		
	13.04 Demonstrate an understanding of channels.		
	13.05 Adjust the transparency, luminance, and reflection of a material.		
	13.06 Demonstrate an understanding of displacement maps.		
	13.07 Demonstrate an understanding of bump maps.		
	13.08 Demonstrate knowledge of material projections.		
	13.09 Demonstrate an understanding of UV mapping.		
	13.10 Demonstrate an understanding of 3D painting.		
	13.11 Understand how light affects the look of materials.		
	13.12 Understand how camera angles can affect the look of materials.		
14.0	Demonstrate knowledge of basic lighting. The student will be able to:		
	14.01 Compare and contrast real lighting with 3D lighting.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	14.02 Demonstrate an understanding of 3 point lighting (key, fill, back).		
	14.03 Demonstrate an understanding of low-key and high-key lighting.		
	14.04 Use include/exclude commands to target light on objects.		
	14.05 Demonstrate use of negative intensity.		SC.912.P.10.19
15.0	Explain visual simulation. The student will be able to:		
	15.01 Define and explain uses of visual simulation.		
	15.02 Explain the use of visual simulation in distributed simulation.		
	15.03 Explain the functions of the image generators, display and databases to support visual subsystem of simulators.		
16.0	Explain distributed simulation. The student will be able to:		
	16.01 Explain networking concepts.		
	16.02 Explain distributed simulation protocols.		
	16.03 Explain the major components in a networked simulation or model.		
17.0	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
	17.01 Explain the use of environmental modeling.		
	17.02 Discuss how to model environmental effects.		
	17.03 Discuss the effects of environmental simulations on related simulations.		
	17.04 Examine environmental models available on the internet.		
18.0	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	
	18.01 Demonstrate information fluency by conducting research need to create an environmental model.		

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
18.02 Use modeling techniques and software to create a basic environmental model.		
18.03 Communicate the relevance of the model and its impact on the real world.		

BTE Core:

The first course recommended in this program is a selection from the BTE Core (**Applied Computer Business Skills I and II, or Computing for College and Careers, or Introduction to Information Technology).** The course selections and their descriptions are located here: BTE Core
Student course enrollment in the BTE Core, as with all other secondary courses, requires the reporting if a program in which the student is enrolled. The BTE Core is not an independent program, but a selection of courses for the initial OCP of a program. Student enrollment in BTE Core cannot be reported without an accompanying program number. Teacher certification and other information regarding the BTE Core is identified by the program in which the student is enrolled. See the selected program framework for the appropriate information.

2015 – 2016

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	

Florida Standards			Correlation to CTE Program Standard #
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). 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	

Florida Standards			Correlation to CTE Program Standard #
		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 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.	

Florida Standards	Correlation to CTE Program Standard #
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:

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
19.0 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	
19.01 Identify the job titles associated with animation and simulation production.		
19.02 Identify various tools and equipment used to produce 3D animation.		
19.03 Understand speed and efficiency concepts.		
19.04 Understand a production pipeline.		
19.05 Identify the departments of an animation studio.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	19.06 Understand the interrelationships among departments.		
	19.07 Understand basic communication concepts (verbal, memos, paperwork).		
	19.08 Identify the stages of production.		
	19.09 Understand studio terms and jargon.		
	19.10 Create and organize production paperwork into design/production documentation.		
	19.11 Identify target audiences, markets, and demographics.		
	19.12 Demonstrate ability to write a professionally formatted script.		
	19.13 Demonstrate ability to breakdown a script into production elements (cast, props).		
	19.14 Demonstrate understanding of visual storytelling and how storyboards are used during production.		
20.0	Demonstrate knowledge of basic animation. The student will be able to:		
	20.01 Apply animation principles to object animation.		
	20.02 Demonstrate an understanding of animation timelines.		
	20.03 Demonstrate an understanding of key framing.		
	20.04 Record and edit key frames.		
	20.05 Demonstrate an understanding in the use of controllers.		
	20.06 Render basic reference animation.		
21.0	Demonstrate knowledge of basic 3D rendering. The student will be able to:		
	21.01 Demonstrate an understanding of processor, hardware and software rendering techniques.		
	21.02 Determine the final render format (size, codec, quality).		
	21.03 Demonstrate an understanding of basic render settings.		
	21.04 Select the range of frames to be rendered.		
22.0	Demonstrate basic understanding of modeling principles. The student will be able to:		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	22.01 Understand 3D construction theory.		
	22.02 Demonstrate an understanding of primitives and parametric modeling.		
	22.03 Demonstrate an understanding of non-uniform rational basis spline (NURBS), splines, and polygonal modeling.		
	22.04 Demonstrate the ability to use reference images and files while modeling.		
23.0	Analyze model fidelity as related to modeling and simulation techniques. The student will be able to:		
	23.01 Define fidelity.		
	23.02 Discuss the ramifications of model fidelity parameters and their variations.		
	23.03 Select the proper level of fidelity to solve a given problem.		
	23.04 Identify the rationale for selecting fidelity level.		
	23.05 Adjust model fidelity parameters to meet output requirements.		
24.0	Explain object models. The student will be able to:		
	24.01 Describe objects using object oriented design (OOD).		
	24.02 Distinguish between abstract and real objects.		
	24.03 Explain why object oriented design is an effective programming paradigm.		
	24.04 Implement classes and methods.		
	24.05 Describe the benefits of object oriented concepts.		
	24.06 Describe object oriented design (OOD) using pseudo-code or Unified Modeling Language (UML).		
25.0	Demonstrate an understanding of mathematical modeling in relation to the production process. The student will be able to:	MAFS.912.A-REI.1.1	
	25.01 Explain mathematical modeling as processes.		
	25.02 Explain the role of modeler in mathematical modeling.		
	25.03 Identify job titles associated with mathematical modeling.		
	25.04 Explain the modeling production pipeline as it relates to mathematical modeling.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
26.0	Explain agent-based simulation. The student will be able to:		
26.01	Demonstrate the concept of a distributed environment.		
26.02	Explore the architecture of agent-based simulation.		
26.03	Demonstrate the uses of agent-based modeling.		
27.0	Demonstrate knowledge of photo editing software. The student will be able to:		
27.01	Demonstrate understanding file formats and storage options.		
27.02	Identify parts of the software interface (menus/palettes).		
27.03	Demonstrate ability to use each of the basic tool sets.		
27.04	Demonstrate ability to import, export and save images.		
27.05	Demonstrate understanding of layers and channels.		
27.06	Demonstrate understanding of filters, effects and plug-ins.		
27.07	Demonstrate understanding of file presets.		
27.08	Demonstrate ability to select portions of an image for manipulation.		
27.09	Demonstrate ability to transform selections and images (crop, scale).		
27.10	Demonstrate ability to color correct images (brightness, hue, contrast).		
27.11	Demonstrate ability to use brushes for image creation and correction.		
27.12	Understand non-destructive and destructive operations.		
27.13	Demonstrate the ability to import, paint and export 3D objects.		
28.0	Demonstrate knowledge of video editing software. The student will be able to:	MAFS.912.G-GMD.2.4	
28.01	Demonstrate understanding file formats and storage options.		
28.02	Identify parts of the software interface (menus/palettes).		
28.03	Demonstrate ability to use each of the basic tool sets.		
28.04	Demonstrate ability to import, export and save video.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	28.05 Demonstrate understanding of layers and compositing.		
	28.06 Demonstrate understanding of filters, effects and plug-ins.		
	28.07 Demonstrate understanding of file presets.		
	28.08 Demonstrate understanding of rendering process.		
	28.09 Demonstrate ability to transform video (crop, scale).		
	28.10 Demonstrate ability to color correct images (brightness, hue, contrast).		
	28.11 Demonstrate ability to use brushes for image creation and correction.		
	28.12 Understand non-destructive and destructive operations.		
	28.13 Demonstrate the compositing integration of rendered 3D animation with video.		
29.0	Incorporate audio assets into modeling and simulation engine. The student will be able to:		
	29.01 Describe the audio effects workflow.		
	29.02 Explain audio codecs and formats used in game/simulation engines.		
	29.03 Import audio into the game/simulation engine.		
	29.04 Use appropriate naming conventions for audio assets.		
	29.05 Describe the use of 3D and surround sound.		
	29.06 Apply knowledge of distance/spatial effects, including surround sound, in a game/simulation.		
	29.07 Analyze the relationship of the audio environment to the visual environment.		
30.0	Utilize basic audio production techniques, sound construction, and editing techniques as related to modeling and simulation. The student will be able to:		
	30.01 Describe the use of digital recording decks and other digital storage devices.		
	30.02 Describe the function and operation of digital audio workstations.		
	30.03 Edit, cut, erase, and insert sound utilizing various digital production techniques.		
	30.04 Perform digital noise reduction and noise extraction via spectral display.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
30.05	Survey and discuss the use of naming conventions and temp sounds.		
30.06	Demonstrate an understanding of various audio construction software.		
30.07	Analyze and discuss methods of matching sound effects to art assets.		
30.08	Identify and categorize commonly used technology sound engine integration equipment.		
30.09	Identify and discuss resources such as sound effects libraries.		
30.10	Examine methods of sound implementation and associated software.		
30.11	Explain how and why digital video may be integrated into a model or simulation design.		
30.12	Explain the roles and responsibilities of the sound design team.		
31.0	Apply industry standards for 3D animation software and user interface to create 3D simple and complex models. The student will be able to:		
31.01	Identify the computer requirements for 3D animation software.		
31.02	Compare and contrast available 3D animation software.		
31.03	Identify available file formats and protocols.		
31.04	Explain the cinematic stage paradigm in 3D software.		
31.05	Demonstrate an understanding of naming conventions.		
31.06	Develop software and file backup plan.		
31.07	Identify common icons within the software.		
31.08	Demonstrate use of keyboard shortcuts.		
31.09	Understand the use of a three-button mouse.		
31.10	Identify the main windows of a 3D program.		
31.11	Identify common window layouts.		
31.12	Identify tool icons within the software.		
31.13	Understand the significance of keyboard shortcut use and efficiency.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	31.14 Demonstrate an understanding of the Euclidean Geometry Model (x-y-z coordinate system).		
	31.15 Demonstrate an understanding of attribute managers.		
	31.16 Demonstrate an understanding of layers.		
	31.17 Navigate the modeling window using pan, rotate, and zoom controls.		
	31.18 Demonstrate knowledge of selection tools (lasso, loop).		
	31.19 View objects in wireframe, gourard shading, lines, boxes and modes.		
	31.20 Demonstrate use of selection sets.		
	31.21 Undo and redo an action within the program.		
	31.22 Locate the help menu system.		
32.0	Demonstrate knowledge of rigging. The student will be able to:		
	32.01 Define rigging as a process.		
	32.02 Define the role of rigger.		
	32.03 Identify job titles associated with a rigger.		
	32.04 Identify rigging creation in the production pipeline.		
33.0	Demonstrate knowledge of basic character setup. The student will be able to:		
	33.01 Compare and contrast rigging approaches and styles.		
	33.02 Demonstrate an understanding of the rig as it relates to the model.		
	33.03 Demonstrate an understanding of skeletal systems.		
34.0	Demonstrate knowledge of motion capture systems. The student will be able to:		
	34.01 Understand knowledge of the history of motion capture.		
	34.02 Understand the awareness of emerging technologies in the industry.		
	34.03 Understand motion capture for 3D production.		
35.0	Use the production process and relevant modeling and simulation techniques and software to	LAFS.910.W.3.7,	

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
design simple 3D simulation. The student will be able to:	LAFS.910.W.3.8, LAFS.910.W.3.9, LAFS.910.W.4.10, LAFS.910.L.2.3	
35.01 Demonstrate information fluency by conducting research need to design simple 3D simulation.		
35.02 Use the production process and relevant modeling and simulation techniques and software to design simple 3D simulation.		
35.03 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 #
36.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Modeling and Simulation.		
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	

Florida Standards			Correlation to CTE Program Standard #
		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 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	
36.4	Range of Reading and Level of Text Complexity		
	36.03.4	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.	
	36.03.5	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	
37.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Modeling and Simulation.		
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.	

Florida Standards			Correlation to CTE Program Standard #
		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 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 Modeling and Simulation.		
	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.	

Florida Standards	Correlation to CTE Program Standard #
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:
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
39.0 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	
39.01 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).		
39.02 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).		
40.0 Build a simple scenario for experimentation or training. The student will be able to:	LAFS.1112.W.1.3	SC.912.N.3.5
40.01 Explain the importance of scenario building in simulations.		
40.02 Identify the building blocks of scenarios.		
40.03 Design a storyboard for a simulation.		
40.04 Build a simple simulation with a finite number of variables.		
40.05 Identify the various components of a simulation.		
40.06 Run a simulation application given specific parameters.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	40.07 Explain verification and validation of a simulation.		
	40.08 Review the importance of scenario building in simulations.		
	40.09 Explore/develop building blocks of scenarios.		
	40.10 Design a detailed storyboard for a simulation.		
	40.11 Build a simulation with a level of fidelity.		
	40.12 Describe the history of gaming and evolution of video games.		
	40.13 Design games using programming techniques.		
	40.14 Implement a simple game using appropriate software.		
41.0	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
	41.01 Use proper attributes to develop a flowchart.		
	41.02 Compare various types of studies (i.e. survey, observation, experiment).		
	41.03 Identify and explain an experimental design process.		
	41.04 Set realistic objectives for the experiment.		
	41.05 Determine the appropriate response or output.		
	41.06 Select process variables or design parameters (control factors), noise factors and the interactions among the process variables of interest.		
	41.07 Perform experimental design execution.		
	41.08 Check that the data are consistent with the experimental assumptions.		
	41.09 Interpret and present results.		
42.0	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

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	42.01 Understand concepts of the transfer of training.		
	42.02 Understand mathematics of physics based real-time simulators.		
	42.03 Describe components of visual systems (image generation, data bases and displays).		
	42.04 Describe theory of motion/control loading simulation and cue synchronization.		
	42.05 Describe trainee station design, sensor simulation and instructor/operator station design.		
	42.06 Understand and utilize collision detection.		
43.0	Understand systems engineering for simulators. The student will be able to:		
	43.01 Understand the systems engineering life cycle process and terminology.		
	43.02 Identify the major milestones in the system life cycle.		
	43.03 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.		
	43.04 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).		
44.0	Use real time technology to model and simulate environments. The student will be able to:		
	44.01 Identify simulator applications.		
	44.02 Identify where team simulators would be appropriate.		
	44.03 Identify where individual simulators would be appropriate.		
	44.04 Understand where and why networked simulators are used.		
45.0	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	
	45.01 Apply logical reasoning skills to solve real-world problems through the development of mathematical models.		
	45.02 Design a step-by-step plan (algorithm) to solve a given problem.		
	45.03 Write program specifications that define the constraints of a given problem.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	45.04 Use a programmable calculator.		
	45.05 Write an algorithm to solve mathematical problems using formulas, equations, and functions.		
46.0	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, MAFS.912.S-ID.2.5, MAFS.912.S-ID.2.6	SC.912.N.2.5
	46.01 Define terminology associated with data collection, statistics and graphing.		
	46.02 Differentiate between the various methods of data collection.		
	46.03 Explain the uses of random number generators.		
	46.04 Recognize various sources of bias in data collection.		
	46.05 Prepare a sample data collection.		
	46.06 Determine the numerical characteristics of a data set and analyze data.		
	46.07 Interpret tables of statistics.		
	46.08 Create bar charts and pie graphs with appropriate software.		
	46.09 Analyze the data to solve a presented problem.		
	46.10 Apply problem analysis using flowcharts or the Unified Modeling Language (UML).		
47.0	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,	

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
		MAFS.912.S-MD2.7	
47.01	Define and explain probability rules and event terminology.		
47.02	Identify events as complementary, dependent, independent, mutually exclusive or not mutually exclusive.		
47.03	Analyze categorical data using two-way tables to describe patterns and departure from patterns and to find marginal frequency and relative frequencies.		
47.04	Distinguish between empirical and theoretical probability.		
47.05	Calculate probabilities.		
47.06	Explain the law of large numbers.		
47.07	Calculate probabilities using addition rules.		
47.08	Calculate probabilities using the multiplications rules.		
47.09	Define the Fundamental Counting Rule, Permutation, and Combination.		
47.10	Perform calculations using the Fundamental Counting Rule, Permutation and Combination.		
47.11	Distinguish when one would use a permutation and when one would use a combination.		
47.12	Define experimental terminology.		
47.13	Explain potential reasons for experimental error.		
47.14	Demonstrate an understanding of the principles of probability by performing a probability experiment within the classroom.		
48.0	Use programming to develop modeling and simulation applications. 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 game/simulation applications.		
48.05	Write code that accesses sequential, random, and direct files.		

CTE Standards and Benchmarks	MA/LA-FS	NGSSS-Sci
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.		
48.10 Write programs as part of a development team.		
48.11 Write event-driven programs.		
48.12 Write programs using timed-event strategies and methodologies.		
48.13 Write programs that include score keeping.		
48.14 Write programs that display text.		
48.15 Write programs that use composite graphic objects.		
48.16 Write programs that load a bitmap for background.		
48.17 Write programs that utilize a sprite handler.		
48.18 Write programs that use animation.		
48.19 Write programs that use scrolling.		
48.20 Write programs that use transparency.		
48.21 Write documentation to assist operators and end-users.		
48.22 Follow established documentation standards.		
48.23 Update existing documentation to reflect program changes.		
49.0 Test programs related to modeling and simulation. The student will be able to:		
49.01 Perform debugging activities.		
49.02 Evaluate program test results.		
49.03 Use trace routines of compilers to assist in program debugging.		
49.04 Compile and run programs.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	49.05 Create a stable code base.		
	49.06 Develop data for use in program testing.		
	49.07 Distinguish among the different types of program and design errors.		
50.0	Perform program maintenance to troubleshoot and optimize code. The student will be able to:		
	50.01 Review requested modification of programs and establish a plan of action.		
	50.02 Design needed modifications in compliance with established standards.		
	50.03 Code, test, and debug modifications prior to updating production code.		
	50.04 Update production programs and documentation with changes.		
	50.05 Analyze output to identify and annotate errors or enhancements.		
51.0	Plan program design using object oriented programming (OOP) for modeling and simulation. 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.		
52.0	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	
	52.01 Demonstrate an understanding of points, vertices, edges, and polygons.		
	52.02 Demonstrate an understanding of poly-count.		
	52.03 Demonstrate an understanding of primitives.		
	52.04 Define parametric primitives.		
	52.05 Locate an object's properties, attributes, and coordinates.		
	52.06 Demonstrate understanding of Non uniform rational b-splines (NURBS).		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	52.07 Demonstrate understanding of splines and generators (extrude, lathe, sweep).		
	52.08 Understand the use of hierarchy.		
	52.09 Demonstrate an understanding of Boolean objects.		
	52.10 Demonstrate an understanding of Null objects.		
	52.11 Demonstrate an understanding of scene management (hiding-unhiding).		
	52.12 Demonstrate an understanding of arrays.		
53.0	Demonstrate knowledge of polygon modeling. The student will be able to:		
	53.01 Demonstrate an understanding of N-gons.		
	53.02 Demonstrate an understanding of subdivision.		
	53.03 Demonstrate basic polygon editing and manipulation.		
	53.04 Demonstrate knowledge of point management (location).		
	53.05 Demonstrate the ability to create polygonal models from points.		
	53.06 Demonstrate an understanding of cutting/division tools.		
	53.07 Demonstrate an understanding of extrudes.		
	53.08 Demonstrate an understanding of symmetry.		
	53.09 Demonstrate an understanding of hyper NURBS.		
	53.10 Demonstrate an understanding of basic deformers (bend, twist, melt).		
54.0	Demonstrate knowledge of animation principles as it relates to the underlying physics of modeling. The student will be able to:		
	54.01 Demonstrate an understanding of the principle of squash and stretch.		
	54.02 Demonstrate an understanding of the principle of anticipation.		
	54.03 Demonstrate an understanding of the principle of staging.		
	54.04 Demonstrate an understanding of the principle of straight ahead action and pose to pose.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	54.05 Demonstrate an understanding of the principle of follow through and overlapping action.		
	54.06 Demonstrate an understanding of the principle of slow in and slow out.		
	54.07 Demonstrate an understanding of the principle of arcs.		
	54.08 Demonstrate an understanding of the principle of secondary action.		
	54.09 Demonstrate an understanding of the principle of timing.		
	54.10 Demonstrate an understanding of the principle of exaggeration.		
	54.11 Demonstrate an understanding of the principle of solid drawing.		
	54.12 Demonstrate an understanding of the principle of appeal.		
55.0	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	
	55.01 Demonstrate information fluency by conducting research need to render a complex 3D simulation.		
	55.02 Use the production process and relevant modeling and simulation techniques and software to render a complex 3D simulation.		
	55.03 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 #
36.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Modeling and Simulation.	
36.1 Key Ideas and Details	
36.1.1 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	
36.1.2 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	
36.1.3 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	
36.2 Craft and Structure	
36.2.1 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	
36.2.2 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	
36.2.3 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	
36.3 Integration of Knowledge and Ideas	
36.3.1 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	
36.3.2 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	
36.3.3 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	
36.4 Range of Reading and Level of Text Complexity	
36.4.1 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. 36.4.2 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	
37.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Modeling and Simulation.	
37.1 Text Types and Purposes	
37.1.1 Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
37.1.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
37.2 Production and Distribution of Writing	
37.2.1 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 #
37.2.2 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	
37.2.3 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	
37.3 Research to Build and Present Knowledge	
37.3.1 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	
37.3.2 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	
37.3.3 Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
37.4 Range of Writing	
37.4.1 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	
38.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Modeling and Simulation.	
38.1 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
38.2 Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
38.3 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
38.4 Model with mathematics. MAFS.K12.MP.4.1	
38.5 Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.5.1	
38.6 Attend to precision. MAFS.K12.MP.6.1	
38.7 Look for and make use of structure. MAFS.K12.MP.7.1	
38.8 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
56.0 Explain and utilize project management and logistics to create and develop 3D modeling and simulation products. The student will be able to:		
56.01 Explain the process groups and knowledge areas that comprise the Project Management body of knowledge using appropriate PMBOK terminology.		
56.02 Define the roles of a Project Manager and stakeholders.		
56.03 Discuss the project life cycle and scope.		
56.04 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.		
56.05 Brainstorm potential risks and develop a risk management plan for the project.		
57.0 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	
57.01 Practice ethical behaviors regarding copyright, citation, and plagiarism.		
57.02 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
57.03	Explain the purposes of copyrights, trademarks, and patents and understand the limitations and expectations.		
57.04	Explore and examine components of intellectual property such as patents, copyrights, trademarks, and trade secrets.		
57.05	Understand “Fair Use and Fair Dealing” practices.		
57.06	Understand the transfer and licensing of creative works.		
57.07	Understand the use of “exclusive rights” to intellectual creations.		
57.08	Utilize digital watermarking.		
58.0	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	
58.01	Identify the usefulness of technology applications.		
58.02	Determine the design architecture.		
58.03	Formulate and test a proof of concept.		
58.04	Understand the value of partnerships and sub-contracting of production and distribution of product.		
58.05	Develop an understanding of the production process.		
58.06	Understand return on investment (ROI) concepts.		
58.07	Examine market analysis of product.		
58.08	Develop a comprehensive business model and present a clear and professional proposal to investors.		
59.0	Use innovative technologies to create prototypes of models. The student will be able to:		
59.01	Identify emerging technologies to develop prototypes.		
59.02	Compare and contrast the benefits and limitations of using various prototyping methods and costs.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
59.03	Use emerging technologies to create a prototype (i.e. 3D printing software, 3D printers or other applicable devices).		
60.0	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
60.01	Know the difference between vectors and bitmaps.		
60.02	Demonstrate an understanding of various 2D art programs.		
60.03	Utilize the programs tools and brushes.		
60.04	Know the importance of layers.		
60.05	Identify file formats.		
60.06	Use digital media software to create a vector of bitmap reference object.		
60.07	Import a reference object into 3D modeling software.		
60.08	Convert a reference object to 3D.		
60.09	Create simple texture in/with a bitmap program.		
61.0	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	
61.01	Understand the design requirements and limitations of a 2D modeling and simulation engine.		
61.02	Demonstrate the use of various mediums and mixed media (traditional or digital) in a 2D modeling and simulation.		
61.03	Demonstrate the ability to create character and object views for animation.		
61.04	Break down animation into a series of pictures to import animation to a modeling and simulation engine.		
61.05	Demonstrate the effective use of animation loops and cycles in a modeling and simulation engine.		
61.06	Demonstrate an understanding of the value of timing to convey character motion.		
61.07	Demonstrate the effective use of animation arcs for the articulation of body elements.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
61.08	Demonstrate the use of principles of animation such as anticipation, squash, stretch, weight, exaggeration and overlapping and secondary motion.		
61.09	Demonstrate the use of phonemes to display speech in animation.		
62.0	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	
62.01	Identify discrete event simulations.		
62.02	Use simulation as an analysis tool.		
62.03	Describe the output distribution.		
62.04	Use historical/empirical data.		
62.05	Interpret summary statistics.		
62.06	Interpret confidence and prediction (certainty) intervals.		
62.07	Identify sources and impact of error in simulations.		
62.08	Describe relationships among variables.		
62.09	Describe the effect of correlation on simulation results.		
63.0	Implement multimedia programming as it relates to modeling simulation using a gaming engine. The student will be able to:		
63.01	Demonstrate proficiency in creating multiple composite objects.		
63.02	Demonstrate proficiency in moving composite graphics objects.		
63.03	Demonstrate proficiency in rotating composite graphics objects manually.		
63.04	Distinguish between flock and flee artificial intelligence algorithms.		
63.05	Write programs that use blitting.		

CTE Standards and Benchmarks		MA/LA-FS	NGSSS-Sci
	63.06 Identify the basic constructs used in bounding box collision algorithms.		
	63.07 Identify the basic constructs used in truer bounding box collisions.		
	63.08 Demonstrate proficiency in creating a bouncing simulation.		
	63.09 Simulate pattern-based movement.		
	63.10 Simulate multiple sprites movement.		
	63.11 Identify the basic constructs used in keyboard input.		
	63.12 Identify the basic constructs used in mouse input.		
	63.13 Identify the basic constructs used in double buffering.		
64.0	Use innovative technologies to create prototypes of models. The student will be able to:		
	64.01 Identify emerging technologies to develop prototypes.		
	64.02 Compare and contrast the benefits and drawbacks of using various prototyping methods and costs.		
	64.03 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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. Secondary or postsecondary students who have previously completed the Software Development Core will not have to repeat the core. 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	Introduction to Information Technology	1 credit	15-1151	2	VO
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	9007240	Java Programming Essentials	1 credit	15-1131	3	VO
	9007250	Applied Object-Oriented Java Programming	1 credit		3	
	9007260	Java Database Programming	1 credit		3	
	9007270	Java Programming Capstone	1 credit		3	

(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%
9007210	3/87 3%	8/80 10%	3/83 4%	5/69 7%	5/67 7%	4/69 6%	4/82 5%	8/66 12%	7/74 9%	5/72 7%	5/70 7%
9007220	22/87 25%	22/80 28%	2/83 2%	21/69 30%	2/67 3%	22/69 32%	2/82 2%	17/66 26%	2/74 3%	21/72 29%	20/70 29%
9007230	21/87 24%	21/80 26%	1/83 1%	20/69 29%	1/67 1%	21/69 30%	1/82 1%	16/66 27%	1/74 1%	20/72 28%	20/70 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%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	40/45 0%
9007210	20/67 30%	14/75 19%	17/54 31%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007220	11/67 16%	19/75 25%	9/54 17%	9/46 17%	0/45 0%	0/45 0%	0/45 0%
9007230	0/67 0%	0/75 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.

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 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 Demonstrate comprehension and communication skills.
06.0 Use technology to enhance the effectiveness of communication skills.
07.0 Develop an awareness of management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Practice quality performance in the learning environment and the workplace.
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 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
11.0 Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals.
12.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
13.0 Demonstrate human relations/interpersonal skills appropriate for the workplace.
14.0 Participate in work-based learning experiences.
15.0 Perform e-mail activities.
16.0 Demonstrate knowledge of different operating systems.
17.0 Demonstrate proficiency navigating the internet, intranet, and the WWW.
18.0 Demonstrate proficiency using HTML commands.
19.0 Demonstrate proficiency in page design applicable to the WWW.
20.0 Demonstrate proficiency using specialized web design software.
21.0 Develop an awareness of the information technology industry.
22.0 Develop an awareness of microprocessors and digital computers.
23.0 Develop an awareness of programming languages.
24.0 Develop an awareness of emerging technologies.
25.0 Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model.
26.0 Demonstrate proficiency using common software applications.
27.0 Demonstrate proficiency using specialized software applications
28.0 Demonstrate language arts knowledge and skills.
29.0 Demonstrate mathematics knowledge and skills.
30.0 Demonstrate science knowledge and skills.
01.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.

02.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
03.0 Distinguish between iterative and non-iterative program control structures.
04.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
05.0 Describe the processes, methods, and conventions for software development and maintenance.
06.0 Explain the types, uses, and limitations of testing for ensuring quality control.
07.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
08.0 Describe information security risks, threats, and strategies associated with software development.
09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
10.0 Solve problems using critical thinking skills, creativity and innovation.
11.0 Use information technology tools.
12.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Java Development & Programming.
13.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Java Development & Programming.
14.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.
15.0 Design a computer program to meet specific physical, operational, and interaction criteria.
16.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
17.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
18.0 Create a unit test plan, implement the plan, and report the results of testing.
19.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
20.0 Describe the importance of professional ethics and legal responsibilities.
21.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
22.0 Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements.
23.0 Design, document, and create object-oriented computer programs.
24.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
25.0 Construct statements that declare, initialize, and modify different types of variables used in Java programs.
26.0 Describe the types and characteristics of lexical units in the Java programming language.
27.0 Describe the data types employed in Java programs.
28.0 Construct Java statements that employ the use of various operators.
29.0 Write executable statements using Java.
30.0 Describe variable scope and its implications in Java programming.
31.0 Apply common Java programming style guidelines and conventions.
32.0 Demonstrate use of the compiler and interpreter through command line interface.
33.0 Construct conditional control statements in Java.
34.0 Construct iterative control statements in Java.
35.0 Use nested loop iterative control statements in Java.
36.0 Produce input and output for Java programs.
37.0 Use packages and import statements in a Java program.
38.0 Create a Java program that uses methods.

39.0 Create a Java program that uses parameters in methods.
40.0 Describe and use recursion in a Java program.
41.0 Construct Java statements that use the String class to manipulate String data.
42.0 Construct Java statements that use Classes.
43.0 Manage class relationships.
44.0 Construct Java statements that illustrate the use of multiplicities in class relationships.
45.0 Use object references.
46.0 Describe the types of arrays and construct Java statements that illustrate the use and manipulation of multi-dimensional and jagged arrays.
47.0 Construct Java statements that illustrate different ways of using inheritance.
48.0 Construct Java statements that use collections.
49.0 Write Java code that uses the Iterator and List interfaces.
50.0 Create Java code that includes exception handling code.
51.0 Create Java code that uses the Object class.
52.0 Use standard library classes that comprise the Java API.
53.0 Create Java code that uses exceptions to improve program quality.
54.0 Describe Java 2 Micro Edition (J2ME) uses, characteristics, and constraints.
55.0 Create and convert classes using Unified Modeling Language (UML).
56.0 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).
57.0 Demonstrate an understanding of Java Integration APIs, including Java Message Service (JMS), Enterprise JavaBeans (EJB), and Java Naming and Directory Interface (JNDI).
58.0 Demonstrate an understanding of Java Client APIs, including the Abstract Window Toolkit (AWT), Swing, and Java applet.
59.0 Understand and apply Java 2 Enterprise Edition (J2EE) Server Solutions.
60.0 Create a database application using the Java programming language.
61.0 Create a graphical user interface application using the Java programming language.
62.0 Create a web-based application using the Java programming language.
63.0 Write code to perform common and union database queries using SQL and Java.
64.0 Implement Java program statements using objects.
65.0 Utilize debugging tools and write error handlers.
66.0 Demonstrate file input/output (I/O).
67.0 Utilize API functions.
68.0 Test and debug databases.
69.0 Successfully work as a member of a software development team.
70.0 Manage time according to a plan.
71.0 Keep acceptable records of progress problems and solutions.
72.0 Plan, organize, and carry out a project plan.
73.0 Manage resources.
74.0 Use tools, materials, and processes in an appropriate and safe manner.
75.0 Demonstrate an understanding of the software development process.
76.0 Research content related to the project and document the results following industry conventions.
77.0 Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience.
78.0 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: **Introduction to Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide an introduction to information technology concepts and careers as well as the impact information technology has on the world, people, and industry and basic web design concepts. The content includes information technology career research; operating systems and software applications; electronic communications including e-mail and Internet services; basic HTML, DHTML, and XML web commands and design; and emerging technologies and web page design. After successful completion of Introduction to Information Technology, students will have met Occupational Completion Point A, Information Technology Assistant, SOC Code 15-1151.

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 the program in which the BTE Core is associated.		
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		

Florida Standards			Correlation to CTE Program Standard #
		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 the program in which the BTE Core is associated.		
	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	

Florida Standards			Correlation to CTE Program Standard #
	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 the program in which the BTE Core is associated.		
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 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 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
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance – the student will be able to:		SC.912.L.14.12, 16, 16.10, 17.11, 13, 15, 16, 19, 20; SC.912.N.1.1, 3, 4, 7, 2.2, 5, 3.5, 4.2
04.01 Develop keyboarding skills to enter and manipulate text and data.	LAFS.910.SL.2.5, LAFS.1112.SL.2.5, LAFS.910.W.2.6, LAFS.1112.W.2.6, LAFS.910.SL.1.2, LAFS.1112.SL.1.2, LAFS.910.L.1.2, LAFS.1112.L.1.2	
04.02 Describe and use current and emerging computer technology and software to perform personal and business related tasks.	LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.910.SL.2.4, LAFS.910.SL.2.5, LAFS.910.SL.2.6, LAFS.910.W.1.2, LAFS.910.W.2.6, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112.SL.1.3, LAFS.1112.SL.2.4, LAFS.1112.SL.2.5, LAFS.1112.SL.2.6, LAFS.1112.W.1.2, LAFS.1112.W.2.6	
04.03 Identify and describe communications and networking systems used in workplace environments.	LAFS.910.RI.2.4, LAFS.1112.RI.2.4, LAFS.910.SL.1.2, LAFS.1112.SL.1.2, LAFS.910.W. 2.4, LAFS.910.W. 2.5, LAFS.910.W. 2.6, LAFS.1112.W. 2.4, LAFS.1112.W. 2.5, LAFS.1112.W. 2.6, LAFS.910.W.3.8, LAFS.1112.W.3.8	
04.04 Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.	LAFS.910.RI.1.1, LAFS.910.RI.1.2, LAFS.910.RI.1.3, LAFS.910.RI.2.4, LAFS.910.RI.2.5, LAFS.910.RI.2.6, LAFS.910.RI.3.7, LAFS.1112.RI.1.1, LAFS.1112.RI.1.2, LAFS.1112.RI.1.3, LAFS.1112.RI.2.4, LAFS.1112.RI.2.5, LAFS.1112.RI.2.6, LAFS.1112.RI.3.7, LAFS.910.RI.4.10, LAFS.1112.RI.4.10	
04.05 Troubleshoot problems with computer hardware peripherals and other office equipment.	LAFS.910.SL1.1, LAFS.1112.SL.1.1, LAFS.910.SL.2.5, LAFS.1112.SL.2.5	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	04.06 Describe ethical issues and problems associated with computers and information systems.	LAFS.910.RI.4.10, LAFS.1112.RI.4.10, LAFS.910.RI.1.1, LAFS.910.RI.1.2, LAFS.910.RI.1.3, LAFS.1112.RI.1.1, LAFS.1112.RI.1.2, LAFS.1112.RI.1.3, LAFS.910.RI.3.8, LAFS.1112.RI.3.8, LAFS.910.W.3.8, LAFS.1112.W.3.8, LAFS.910.W.1.1, LAFS.1112.W.1.1, LAFS.910.W.1.2, LAFS.1112.W.1.2, LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.910.SL.2.4, LAFS.910.SL.2.5, LAFS.910.SL.2.6, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112.SL.1.3, LAFS.1112.SL.2.4, LAFS.1112.SL.2.5, LAFS.1112.SL.2.6	
05.0	Demonstrate comprehension and communication skills – the student will be able to:		
	05.01 Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	05.02 Organize ideas and communicate oral and written messages appropriate for information technology environments.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
	05.03 Collaborate with individuals and teams to complete tasks and solve information technology problems.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	05.04 Identify, define, and discuss professional information technology terminology appropriate for internal and external communications in an information technology environment.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L 2.3, 3.4, 3.5, 3.6	
	05.05 Apply the writing process to the creation of appropriate documents following designated business formats.	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L.1.1, 1.2 LAFS.1112.L1.1, 1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
05.06	Demonstrate an awareness of project management concepts and tools (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration).	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
06.0	Use technology to enhance the effectiveness of communication skills – the student will be able to:		SC.912.N.1.1, 4, 2.2, 3.5
06.01	Use database, spreadsheet, presentation software, scheduling, and integrated software packages to enhance communication.	LAFS.910.RI.4.1 LAFS.910.W.4.1 LAFS.1112.RI.4.1 LAFS.1112.W.4.1 MAFS 912.A-CED.1.1	
06.02	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.	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L.1.1, 1.2 LAFS.1112.L1.1, 1.2	
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles – the student will be able to:		
07.01	Explore, design, implement, and evaluate organizational structures and cultures.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
07.02	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.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
07.03	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.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
08.0	Practice quality performance in the learning environment and the workplace – the student will be able to:		
08.01	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).	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
08.02	Develop criteria for assessing products and processes that incorporate effective business practices (e.g., time management,	LAFS.910.SL.1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	productivity, total quality management).		
09.0	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:		
09.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
10.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance – the student will be able to:		
10.01	Analyze, interpret, compile, and demonstrate the ability to present/communicate data in understandable and measurable terms using common statistical procedures.	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1 MAFS 912.S-ID.1.1 MAFS.9.12.A-APR.4.6 MAFS.912.A-CED.1.3 MAFS.912.S-MD.2.5 B	
10.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	SC.912.N.1.5
10.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas when appropriate.	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1 MAFS.912.A-CED.1.1, 1.3, 1.4 MAFS 912.A-REI.2.3	
11.0	Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals – the student will be able to:		
11.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	11.02 Analyze job and career requirements and relate career interests to opportunities in the global economy.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:		
	12.01 Research, compare, and contrast information technology career clusters (e.g., characteristics needed, skills required, education required, industry certifications, advantages and disadvantages of information technology careers, the need for information technology workers).	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	12.02 Describe the variety of occupations and professions within the world of information technology including those where information technology is either in a primary focus or in a supportive role.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
	12.03 Describe job requirements for the variety of occupations and professions within the global world of information technology.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
	12.04 Analyze personal skills and aptitudes in comparison with information technology career opportunities.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
	12.05 Refine and implement a plan to facilitate personal growth and skill development related to information technology career opportunities.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
	12.06 Develop and maintain an electronic career portfolio, to include, but not limited to the Resume and Letter of Application.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
13.0	Demonstrate human relations/interpersonal skills appropriate for the workplace – the student will be able to:		
13.01	Accept constructive criticism.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
13.02	Demonstrate personal and interpersonal skills appropriate for the workplace (e.g., responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, professional dress).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
14.0	Participate in work-based learning experiences – the student will be able to:		
14.01	Participate in work-based learning experiences in an information technology environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
14.02	Discuss the use of technology in an information technology environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
15.0	Perform e-mail activities – the student will be able to:		SC.912.N.1.1, 4, 3.5, 4.1, 2
15.01	Describe e-mail capabilities and functions.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.02	Identify components of an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.03	Identify the components of an e-mail address.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.04	Identify when to use different e-mail options.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.05	Attach a file to an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.06	Forward an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.07	Use an address book.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.08	Reply to an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.09	Use the Internet to perform e-mail activities.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.10	Identify the appropriate use of e-mail and demonstrate related e-mail etiquette.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.11	Identify when to include information from an original e-mail message in a response.	LAFS.910.W.4.1 LAFS.1112.W.4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	15.12 Identify common problems associated with widespread use of e-mail.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.0	Demonstrate knowledge of different operating systems – the student will be able to:		
	16.01 Identify operating system file naming conventions.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	16.02 Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	16.03 Demonstrate a working knowledge of standard file formats.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	16.04 Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
17.0	Demonstrate proficiency navigating the internet, intranet, and the WWW – the student will be able to:		
	17.01 Identify and describe Web terminology.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.02 Demonstrate proficiency in using the basic features of GUI browsers (e.g., setting bookmarks, basic configurations, e-mail configurations, address book).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.03 Define Universal Resource Locators (URLs) and associated protocols (e.g., .com, .org, .edu, .gov, .net, .mil).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.04 Describe and observe Internet/Intranet ethics and copyright laws and regulatory control.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.05 Trace the evolution of the Internet from its inception to the present and into the future.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	17.06 Demonstrate proficiency using search engines (e.g., Yahoo!, Google).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.07 Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.08 Identify effective Boolean search strategies.	LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
18.0	Demonstrate proficiency using HTML commands – the student will be able to:		
	18.01 Identify elements of a Web page.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9 4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3. 9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
	18.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9 4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3. 9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
	18.03 Define basic HTML terminology.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9 4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3. 9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
	18.04 Analyze HTML source code developed by others.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9 4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.07 Edit and test HTML documents for accuracy and validity.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.08 Use basic functions of WYSIWYG editors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.09 Use basic functions of HTML, DHTML, and XML editors and converters.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.10 Enhance web pages through the addition of images and graphics including animation.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.0 Demonstrate proficiency in page design applicable to the WWW – the student will be able to:		
19.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.02 Describe and apply color theory as it applies to Web page design (e.g., background and text color).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.04 Use image design software to create and edit images.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.05 Demonstrate proficiency in publishing to the Internet.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.06 Demonstrate proficiency in adding downloadable forms to web pages.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	19.07 Explain the need for web-based applications.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
20.0	Demonstrate proficiency using specialized web design software – the student will be able to:		
	20.01 Compare and contrast various specialized web design software (e.g., Flash, Shockwave, GoLive, Director).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
	20.02 Demonstrate proficiency using use of various specialized web design software (e.g., Flash, Shockwave, GoLive, Director).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
21.0	Develop an awareness of the information technology industry – the student will be able to:		
	21.01 Explain how information technology impacts the operation and management of business and society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	21.02 Explain the emergence of e-commerce and e-government and the potential impact on business and society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
21.03 Explain the emergence of a paperless society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.0 Develop an awareness of microprocessors and digital computers – the student will be able to:		
22.01 Describe the evolution of the digital computer.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.02 Explain the general architecture of a microcomputer system.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.03 Explain the evolution of microprocessors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.04 Explain software hierarchy and its impact on microprocessors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.05 Explain the need for and use of peripherals.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.06 Demonstrate proficiency using peripherals.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.07 Identify the basic concepts of computer maintenance and upgrades.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
22.08 Differentiate between diagnosing and troubleshooting.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.0 Develop an awareness of programming languages – the student will be able to:		
23.01 Explain the history of programming languages.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.02 Explain the need for and use of compilers.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.03 Explain how compilers work.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.04 Identify the three types of programming design approaches (e.g., top-down, structured, and object-oriented).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
24.0 Develop an awareness of emerging technologies – the student will be able to:		
24.01 Compare and contrast various methods of evaluation for emerging technologies.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
24.02 Demonstrate knowledge of the process of planning upgrades and changeovers.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
24.03	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.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.0	Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model – the student will be able to:		
25.01	Identify how types of networks and how they work.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.02	Identify the role of servers and clients on a network.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.03	Identify benefits and risks of networked computing.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.04	Identify the relationship between computer networks and other communications networks (i.e. telephone systems).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.05	Identify Intranets, Extranets and how they relate to the Internet.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.06	Demonstrate basic understanding of network administration.	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.4.1 LAFS.1112.W4.1 LAFS.910.L.2.3, 3.4, 3.6 LAFS.1112.L.2.3, 3.4, 3.6	
25.07	Describe the evolution of OSI from its inception to the present and into the future.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.08	Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.4.1 LAFS.1112.W4.1 LAFS.910.L.2.3, 3.4, 3.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.L.2.3, 3.4, 3.6	
26.0	Demonstrate proficiency using common software applications – the student will be able to:		
	26.01 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.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	SC.912.N.1.1, 3, 4, 6, 7, 3.5, 4.2; SC.912.P.10.18
	26.02 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).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	SC.912.N.1.1, 3, 4, 1.7, 3.5;
27.0	Demonstrate proficiency using specialized software applications – the student will be able to:		
	27.01 Compare and contrast the appropriate use of specialized software applications (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation process control, materials management).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	27.02 Demonstrate awareness of specialized software applications (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation, process control, materials management).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	27.03 Demonstrate the ability to incorporate digital sound.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

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 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 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 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 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
31.0	Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:		
31.01	Describe the evolution of programming and programming careers.	MAFS.912.A-REI.1.1	
31.02	Identify tasks performed by programmers.	MAFS.912.N-Q.1.1	
31.03	Describe how businesses use computer programming to solve business problems.	MAFS.912.A-REI.1.1	
31.04	Investigate job opportunities in the programming field.		
31.05	Explain different specializations and the related training in the computer programming field.	MAFS.912.A-REI.1.1 MAFS.912.G-SRT.1.2	
31.06	Explain the need for continuing education and training of computer programmers.	MAFS.912.A-REI.1.1	
31.07	Explain enterprise software systems and how they impact business.	MAFS.912.A-REI.1.1	
31.08	Describe ethical responsibilities of computer programmers.	MAFS.912.A-REI.1.1	
31.09	Describe the role of customer support to software program quality.	MAFS.912.A-REI.1.1	
31.10	Identify credentials and certifications that may improve employability for a computer programmer.	MAFS.912.N-Q.1.1	
31.11	Identify devices, tools, and other environments for which programmers may develop software.	MAFS.912.G-CO.4.12; MAFS.912.N-Q.1.1	
32.0	Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:		
32.01	Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.	MAFS.912.N-Q.1.2	
32.02	Explain the types and uses of variables in programs.	MAFS.912.A-REI.1.1; MAFS.912.A-SSE.1.1	
32.03	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
32.04	Identify the types of operations that can be performed on different data types.	MAFS.912.N-Q.1.1	
32.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
32.06	Explain how computers store different data types in memory.	MAFS.912.A-REI.1.1	
32.07	Use different number systems to represent data.	MAFS.912.N-Q.1.1	
32.08	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.	MAFS.912.A-REI.1.1	
32.09	Use Boolean logic to perform logical operations.		
33.0	Distinguish between iterative and non-iterative program control structures. – The student will be able to:		
33.01	Explain non-iterative programming structures (e.g., if, if/else) and their uses.	MAFS.912.A-REI.1.1	
33.02	Explain iterative programming structures (e.g., while, do/while) and their uses.	MAFS.912.A-REI.1.1	
34.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:		
34.01	Identify the characteristics, uses, and limits of low-level programming languages.	MAFS.912.N-Q.1.1	
34.02	Identify the characteristics, uses, and limits of high-level programming languages.	MAFS.912.N-Q.1.1	
34.03	Identify the characteristics, uses, and limits of rapid development programming languages.	MAFS.912.N-Q.1.1	
34.04	Describe object-oriented concepts.	MAFS.912.A-REI.1.1	
34.05	Explain the characteristics of procedural and object-oriented programming languages.	MAFS.912.A-REI.1.1	
34.06	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	
35.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:		
35.01	Describe and explain tools used in software development.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	
35.02	Describe the stages of the program life cycle.	MAFS.912.A-REI.1.1	
35.03	Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).	MAFS.912.G-SRT.1.2	
35.04	List and explain the steps in the program development cycle.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
35.05	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	
35.06	Describe the on-going need for program maintenance.	MAFS.912.A-REI.1.1	
35.07	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	
35.08	Describe different methods used to facilitate version control and change management.	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
36.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:		
36.01	Explain the uses and limits of testing in ensuring program quality.	MAFS.912.A-REI.1.1	SC.912.N.1.1
36.02	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	
36.03	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
36.04	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	
36.05	Identify the data to be used for boundary conditions.	MAFS.912.N-Q.1.1	
36.06	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
37.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:		
37.01	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
37.02	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
37.03	Explain the role of existing libraries and packages in facilitating programmer productivity.	MAFS.912.A-REI.1.1	
37.04	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
37.05	Write a program design document using UML or other standard design methodology.	MAFS.912.A-CED.1.1	
37.06	Define input and output for a program module using UML or other standard design methodology.	MAFS.912.F-IF.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
38.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:		
38.01	Explain the security risks to personal and business computer users.	MAFS.912.S-IC.2.6	
38.02	Identify different types of threats to computer systems.	MAFS.912.N-Q.1.1	
38.03	Identify methods to protect against different threats to computer systems.	MAFS.912.N-Q.1.1	
38.04	Understand the importance of a disaster / emergency response plan.		
38.05	Identify alternative methods for data storage and backup (e.g., mirroring, fail-over, high availability, types of backups).	MAFS.912.N-Q.1.1	
39.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
39.01	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
39.02	Locate, organize and reference written information from various sources.		SC.912.N.1.1.6
39.03	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
39.04	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
39.05	Apply active listening skills to obtain and clarify information.		
39.06	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
39.07	Exhibit public relations skills that aid in achieving customer satisfaction.		
40.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
40.01	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
40.02	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
40.03	Identify and document workplace performance goals and monitor progress toward those goals.	MAFS.912.N-Q.1.1	
40.04	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
41.0	Use information technology tools. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
41.01	Use personal information management (PIM) applications to increase workplace efficiency.		
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.G-CO.4.12	
41.03	Employ computer operations applications to access, create, manage, integrate, and store information.	MAFS.912.Z-CED.1.1	
41.04	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 #
42.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Java Development & Programming.		
42.01	Key Ideas and Details		
	42.01.1	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	
	42.01.2	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	
	42.01.3	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	
42.02	Craft and Structure		
	42.02.1	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	
	42.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	42.02.3	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	
42.03	Integration of Knowledge and Ideas		
	42.03.1	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	
	42.03.2	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	
	42.03.3	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	
42.04	Range of Reading and Level of Text Complexity		
	42.04.1	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.	
	42.04.2	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	
43.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Java Development & Programming.		
43.01	Text Types and Purposes		
	43.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	43.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
43.02	Production and Distribution of Writing		
	43.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	43.02.2	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	
	43.02.3	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	
	43.03	Research to Build and Present Knowledge	
	43.03.1	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	
	43.03.2	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	
	43.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	43.04	Range of Writing	
	43.04.1	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	
44.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.		
	44.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	44.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	44.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	44.04	Model with mathematics. MAFS.K12.MP.4.1	
	44.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	44.06	Attend to precision. MAFS.K12.MP.6.1	
	44.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
44.08 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
45.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:		
45.01	Choose appropriate data types depending on the needs of the program.	MAFS.912.N-Q.1.1	
45.02	Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).	MAFS.912.N-Q.1.2	
45.03	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	
45.04	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	
45.05	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	
46.0	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:		
46.01	Use appropriate naming conventions to define program variables and modules (methods, functions).	MAFS.912.N-Q.1.1	
46.02	Use a program editor to write the source code for a program.	MAFS.912.A-REI.1.1	
46.03	Write programs that use selection structures (e.g., if, if/else).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.04	Write programs that use repetition structures (e.g., while, do/while).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.05	Write programs that use nested structures.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.06	Use internal documentation (e.g., single-line and multi-line comments, program headers, module descriptions, and meaningful variable and function/module names) to document		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	a program according to accepted standards.		
46.07	Compile and run programs.	MAFS.912.A-REI.1.1	
46.08	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	
46.09	Write programs that use standard logic operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.10	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	
46.11	Write programs that perform data conversion between standard data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.12	Write programs that define, use, search, and sort arrays.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.13	Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.14	Demonstrate understanding and use of appropriate variable scope.	MAFS.912.A-REI.1.1	
47.0	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:		
47.01	Write programs that perform user input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
47.02	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	
	47.03 Write program modules such as functions, subroutines, or methods.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.04 Write program modules that accept arguments.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.05 Write program modules that return values.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.06 Write program modules that validate arguments and return error codes.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.07 Write interactive programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.08 Write programs that use standard libraries to enhance program function.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.		
48.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:		
	48.01 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
	48.02 Test and debug programs, including programs written by others.	MAFS.912.A-REI.1.1	
	48.03 Write a test report that identifies the results of testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	48.04 Trace through the function of a program to ensure valid operation.	MAFS.912.N-Q.1.1	
	48.05 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	
	48.06 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	
49.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
49.01	Employ leadership skills to accomplish organizational goals and objectives.		
49.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
49.03	Conduct and participate in meetings to accomplish work tasks.		
50.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
50.01	Evaluate and justify decisions based on ethical reasoning.	MAFS.912.S-IC.2.6	
50.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	MAFS.912.S-IC.2.6	
50.03	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 #
42.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Java Development & Programming.		
42.01	Key Ideas and Details		
	42.01.1	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	
	42.01.2	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	
	42.01.3	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	
42.02	Craft and Structure		
	42.02.1	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	
	42.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	42.02.3	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	
42.03	Integration of Knowledge and Ideas		
	42.03.1	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	
	42.03.2	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	
	42.03.3	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	
42.04	Range of Reading and Level of Text Complexity		
	42.04.1	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.	
	42.04.2	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	
43.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Java Development & Programming.		
43.01	Text Types and Purposes		
	43.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	43.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
43.02	Production and Distribution of Writing		
	43.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	43.02.2	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	
	43.02.3	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	
	43.03	Research to Build and Present Knowledge	
	43.03.1	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	
	43.03.2	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	
	43.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	43.04	Range of Writing	
	43.04.1	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	
44.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.		
	44.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	44.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	44.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	44.04	Model with mathematics. MAFS.K12.MP.4.1	
	44.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	44.06	Attend to precision. MAFS.K12.MP.6.1	
	44.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
44.08 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
51.0 Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:		
51.01 Demonstrate the understanding and use of classes, objects, attributes, and behaviors.	MAFS.912.A-REI.1.1	
51.02 Demonstrate the understanding and use of inheritance.	MAFS.912.A-REI.1.1	
51.03 Demonstrate the understanding and use of data encapsulation.	MAFS.912.A-REI.1.1	
51.04 Demonstrate the understanding and use of polymorphism.	MAFS.912.A-REI.1.1	
52.0 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:		
52.01 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	
52.02 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	
52.03 Design an object-oriented program using UML or another standard design methodology.	MAFS.912.H-CED.1.1	
52.04 Work with other team members to develop a project plan for a program.	MAFS.912.A-REI.1.1	
52.05 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	
52.06 Participate in design meetings that review program design documents for conformance to program requirements.	MAFS.912.S.IC.2.6	
52.07 Estimate the time to develop a program or module.	MAFS.912.S.IC.2.6	
53.0 Design, document, and create object-oriented computer programs. – The student will be able to:		
53.01 Compare and contrast recursive functions to other iterative methods.	MAFS.912.G-SRT.1.2	
53.02 Understand the implementation of character strings in the programming language.		
53.03 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).		
53.04 Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.05 Write object-oriented programs that use inheritance.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.06 Write object-oriented programs that use polymorphism.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.07 Develop class constructors.	MAFS.912.S-MD.1.3	
53.08 Write programs that define and use program constants.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.09 Write programs that perform error handling.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.10 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	
53.11 Write programs that perform dynamic memory allocation.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.12 Write programs that perform effective management of dynamically allocated memory.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.13 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	
53.14 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	
53.15 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	
	53.16 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	
	53.17 Perform basic database commands including connect, open, select, and close.	MAFS.912.A-REI.1.1	
54.0	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:		
	54.01 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
	54.02 Write test plans for event-driven programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	54.03 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
	54.04 Perform test and debug activities on object-oriented programs, including those written by someone else.	MAFS.912.A-REI.1.1	
	54.05 Perform test and debug activities on an event-driven program.	MAFS.912.A-REI.1.1	
	54.06 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	
	54.07 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
55.0	Construct statements that declare, initialize, and modify different types of variables used in Java programs. – The student will be able to:		
55.01	Describe how variables are used in programs.		
55.02	Identify the eight Java primitive data types.		
55.03	Identify the minimum and maximum ranges of primitive data types.		
55.04	Identify which data type should be used for a given situation.		
55.05	Identify the syntax for using variables.		
55.06	Declare and initialize variables.		
55.07	Assign new values to variables.		
55.08	Create and use constant variables.		
56.0	Describe the types and characteristics of lexical units in the Java programming language. – The student will be able to:		
56.01	Describe the types of lexical units.		
56.02	Describe identifiers and identify valid and invalid identifiers.		
56.03	Describe and identify reserved words, delimiters, literals, and comments.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
57.0	Describe the data types employed in Java programs. – The student will be able to:		
57.01	Describe the data type categories.		
57.02	Give examples of primitives, reference data types.		
57.03	Identify and use enumerations.		
57.04	Understand the use of Wrapper Classes in programs.		
57.05	Describe the difference between real and integer data types.		
58.0	Construct Java statements that employ the use of various operators. – The student will be able to:		
58.01	Construct statements using arithmetic operators.		
58.02	Construct statements using relational operators.		
58.03	Construct and use statements using logical operators.		
58.04	Construct and use statements using assignment operators.		
58.05	Construct and execute statements using operator precedence.		
59.0	Write executable statements using Java. – The student will be able to:		
59.01	Construct variable assignment statements.		
59.02	Construct statements using built-in Math functions.		
59.03	Differentiate between implicit and explicit data type conversions.		
59.04	Describe when implicit data type conversions take place.		
59.05	List the drawbacks of implicit data type conversions.		
59.06	Describe the process of autoboxing and promotion.		
59.07	Construct statements using functions to explicitly convert data types.		
60.0	Describe variable scope and its implications in Java programming. – The student will be able to:		
60.01	Understand the scope and visibility of variables.		
60.02	Write programs using local variables.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	60.03 Describe the scope of a variable.		
	60.04 Describe the default value of local, instance, and static scope of variables.		
	60.05 Describe how compiler uses scope to identify variables with the same name.		
61.0	Apply common Java programming style guidelines and conventions. – The student will be able to:		
	61.01 List examples of good programming practices.		
	61.02 Insert comments into code.		
	61.03 Follow formatting guidelines when writing code.		
	61.04 Understand the different types of errors produced by programs.		
62.0	Demonstrate use of the compiler and interpreter through command line interface. – The student will be able to:		
	62.01 Describe the use of the Java compiler (javac) and Java interpreter (Java VM).		
	62.02 Demonstrate the use of the - classpath flag and –d flag to the compiler.		
	62.03 Identify the environmental variables of PATH and CLASSPATH.		
	62.04 Describe the process of command line arguments to the program.		
	62.05 Create programs that take in multiple command line arguments.		
63.0	Construct conditional control statements in Java. – The student will be able to:		
	63.01 Construct and use an if statement.		
	63.02 Construct and use a switch statement.		
	63.03 Construct and use a while, do while, and for loop.		
	63.04 Construct and use a conditional operator.		
64.0	Construct iterative control statements in Java. – The student will be able to:		
	64.01 Describe the types of loop statements and their uses.		
	64.02 Construct and use the while and do while loop.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
64.03 Construct and use the for loop.		
64.04 Construct and use the enhanced for loop.		
64.05 Describe when a while loop is used.		
64.06 Describe when a for loop is used.		
65.0 Use nested loop iterative control statements in Java. – The student will be able to:		
65.01 Construct and execute a program using nested loops.		
65.02 Construct and execute a loop using break and continue.		
65.03 Evaluate a nested loop construct and sentinel value.		
66.0 Produce input and output for Java programs. – The student will be able to:		
66.01 Describe and use classes (e.g., Scanner, System) to input data into programs.		
66.02 Demonstrate the use of different ways to input data into programs using Scanner or System class.		
66.03 Describe and demonstrate the use of the System class to produce output to the console.		
66.04 Explain the difference between print and println functions in the System class.		
66.05 Create and use escape sequences.		
67.0 Use packages and import statements in a Java program. – The student will be able to:		
67.01 Describe the use of import statements.		
67.02 Describe the use of packages.		
67.03 Create code that uses package statements to avoid class conflict.		
67.04 Create packages that abide by standard Java naming convention.		
67.05 Demonstrate the use of Java-API to search for classes and packages.		
68.0 Create a Java program that uses methods. – The student will be able to:		
68.01 Differentiate between anonymous blocks and methods.		
68.02 Identify the benefits of using methods.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	68.03 Describe a method signature.		
	68.04 Create a method.		
	68.05 Describe how a method is invoked.		
	68.06 Describe the purpose of overloading methods.		
	68.07 Create overloaded methods in programs.		
69.0	Create a Java program that uses parameters in methods. – The student will be able to:		
	69.01 Describe how parameters are passed into functions.		
	69.02 Define a parameter.		
	69.03 Create a method using a parameter.		
	69.04 Invoke a method that has parameters.		
	69.05 Distinguish between formal and actual parameters.		
	69.06 Demonstrate the use of reference parameters in methods.		
70.0	Describe and use recursion in a Java program. – The student will be able to:		
	70.01 Describe the use of recursion in solving problems.		
	70.02 Describe the difference of iterative and recursive methods.		
	70.03 Demonstrate the use of direct recursion.		
	70.04 Demonstrate the use of indirect recursion.		
71.0	Construct Java statements that use the String class to manipulate String data. – The student will be able to:		
	71.01 Explain the use of the String class.		
	71.02 Create code to concatenate strings using the concatenation operator.		
	71.03 Demonstrate how to search a string using indexOf method of the String class.		
	71.04 Explain the effect of immutability of Strings.		
	71.05 Create Strings using string literals, and through new keyword.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
71.06 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
72.0 Construct Java statements that use Classes. – The student will be able to:		
72.01 Describe and identify abstract data types.		
72.02 Describe the difference between an object and a class.		
72.03 Identify class attributes.		
72.04 Create instance variables for a class.		
72.05 Use visibility modifiers for attributes.		
72.06 Identify constructors and describe their use.		
72.07 Describe encapsulation.		
72.08 Write class using encapsulation.		
72.09 Apply data abstraction through the use of accessor or and mutator methods.		
72.10 Describe the equals method.		
72.11 Demonstrate the use of classes in methods as both parameters and return types.		
72.12 Describe the garbage collection process.		
72.13 Demonstrate reusability and extensibility in class creation.		
72.14 Demonstrate the use of Comparable interface to compare objects.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
73.0	Manage class relationships. – The student will be able to:		
73.01	Explain the association relationship among classes.		
73.02	Explain the direct association relationship among classes.		
73.03	Explain the composition and aggregation relationship among classes.		
73.04	Explain the direct association relationship among classes.		
73.05	Write programs that use composition, association.		
73.06	Write programs that use direct association.		
74.0	Construct Java statements that illustrate the use of multiplicities in class relationships. – The student will be able to:		
74.01	Describe how multiplicities affect class relationships.		
74.02	Describe one-to one, one-to-many, and many-to-many relationships.		
74.03	Write programs that use multiplicities in class relationships.		
75.0	Use object references – The student will be able to:		
75.01	Identify reference aliases.		
75.02	Understand and use null reference.		
75.03	Explain the this reference and its use in class creation.		
76.0	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:		
76.01	Declare and initialize and array.		
76.02	Demonstrate the use of initializer lists.		
76.03	Demonstrate the use of arrays in methods.		
76.04	Demonstrate the updating, populating and destroying arrays.		
76.05	Explain linear and binary searching.		
76.06	Sort arrays using selection sort, insertion sort, and bubble sort.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	76.07 Demonstrate the use of multidimensional arrays.		
	76.08 Demonstrate the use of jagged arrays.		
	76.09 Demonstrate basic hashing using arrays.		
77.0	Construct Java statements that illustrate different ways of using inheritance. – The student will be able to:		
	77.01 Explain the purpose and use of inheritance in object oriented programming.		
	77.02 Explain the difference between single and multiple inheritance.		
	77.03 Create parent and child classes.		
	77.04 Create overloaded methods.		
	77.05 Describe the has-a and is-a relationship.		
	77.06 Create class hierarchies.		
	77.07 Explain the process of generalization to specification.		
	77.08 Demonstrate the use of abstract classes.		
	77.09 Explain polymorphism.		
	77.10 Create a program that uses polymorphism.		
	77.11 Demonstrate the use of the instance of method.		
78.0	Construct Java statements that use collections. – The student will be able to:		
	78.01 Describe data structure of linked lists.		
	78.02 Create a linked list manually.		
	78.03 Use the ArrayList class.		
	78.04 Create a stack and Queue manually.		
	78.05 Use the Stack and Queue standard class.		
	78.06 Identify which data structure is best fitted for a situation.		
	78.07 Use iterators with collections.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
78.08 Identify how to insert, delete, update, and traverse data structures.		
79.0 Write Java code that uses the Iterator and List interfaces. – The student will be able to:		
79.01 Describe the purpose of interfaces.		
79.02 Create and use interfaces in programs.		
79.03 Use the Comparable interface.		
79.04 Use the Iterator interface and List Interface in programs.		
79.05 Understand the program to the interface principle.		
80.0 Create Java code that includes exception handling code. – The student will be able to:		
80.01 Describe the advantages of including exception handling code.		
80.02 Describe the purpose of an EXCEPTION section in a program block.		
80.03 Create code to include an EXCEPTION section.		
80.04 List the guidelines for exception handling.		
81.0 Create Java code that uses the Object class. – The student will be able to:		
81.01 Understand the Object class relationship to other classes.		
81.02 Demonstrate the use of toString method.		
81.03 Demonstrate the use of clone and finalize methods.		
81.04 Write program to use Object class functionality.		
82.0 Use standard library classes that comprise the Java API. – The student will be able to:		
82.01 Describe the classes and methods in the basic input/output package.		
82.02 Describe the classes and methods in the utilities package.		
82.03 Describe the classes and methods in the networking package.		
82.04 Describe the classes and methods in the AWT and swing package.		
82.05 Describe the classes and methods in the SQL and SQLX package.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
83.0	Create Java code that uses exceptions to improve program quality. – The student will be able to:		
83.01	Explain how exception handling works in Java.		
83.02	Trap exceptions using try and catch.		
83.03	Explain when to use the finally clause.		
83.04	Demonstrate handling exceptions through throwing and catching.		
83.05	Create and Exception and manage the exception.		
83.06	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
84.0	Describe Java 2 Micro Edition (J2ME) uses, characteristics, and constraints. – The student will be able to:		
	84.01 Understand midlets.		
	84.02 Explain CLDC and profiles.		
	84.03 Explain the constraints specific to J2ME programming when compared to J2SE.		
	84.04 Understand the high architectural goal of J2ME.		
	84.05 Create user-defined functions.		
85.0	Create and convert classes using Unified Modeling Language (UML). – The student will be able to:		
	85.01 Identify UML elements Classes, abstract Classes, Interfaces.		
	85.02 Identify UML attributes, operators, visibility modifiers and UML associations.		
	85.03 Given a set of classes be able to convert the classes to a UML diagram.		
	85.04 Given a UML diagram be able to create classes.		
86.0	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:		
	86.01 Understand and describe RMI.		
	86.02 Write a program to use RMI.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	86.03 Understand RDMS and SQL technologies.		
	86.04 Use the Java Database Connectivity API to connect and execute SQL statements to RDMS.		
87.0	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:		
	87.01 Understand and describe JMS.		
	87.02 Understand and describe EJB technology.		
	87.03 Understand and describe JNDI technology.		
88.0	Demonstrate an understanding of Java Client APIs, including the Abstract Window Toolkit (AWT), Swing, and Java applet. – The student will be able to:		
	88.01 Understand and describe AWT and GUI interface.		
	88.02 Understand and describe the use of Swing components and GUI.		
	88.03 Understand and describe the use of applet technology.		
89.0	Understand and apply Java 2 Enterprise Edition (J2EE) Server Solutions. – The student will be able to:		
	89.01 Understand java Web Services.		
	89.02 Underrated and use SMTP and Java Mail technologies.		
	89.03 Understand how to use JSP and Servlets.		
90.0	Create a database application using the Java programming language. – The student will be able to:		
	90.01 Utilize loop statements.		
	90.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.		
	90.03 Create user-defined functions.		
	90.04 Utilize common built-in functions.		
	90.05 Declare variables in modules and procedures.		
	90.06 Declare arrays, and initialize elements of arrays.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
90.07	Declare and use object variables and collections, and use their associated properties and methods.		
90.08	Declare symbolic constants, and make them available locally or publicly.		
90.09	Respond to events.		
91.0	Create a graphical user interface application using the Java programming language. – The student will be able to:		
91.01	Utilize loop statements.		
91.02	Given a scenario, use arithmetic, comparison, and pattern-matching operators.		
91.03	Create user-defined functions.		
91.04	Utilize common built-in functions.		
91.05	Declare variables in modules and procedures.		
91.06	Declare arrays, and initialize elements of arrays.		
91.07	Declare and use object variables and collections, and use their associated properties and methods.		
91.08	Declare symbolic constants, and make them available locally or publicly.		
91.09	Use the Java Event model to handle user inputs from events.		
91.10	Use JComponents and layout managers to create the GUI.		
92.0	Create a web-based application using the Java programming language. – The student will be able to:		
92.01	Utilize loop statements.		
92.02	Given a scenario, use arithmetic, comparison, and pattern-matching operators.		
92.03	Create user-defined functions.		
92.04	Utilize common built-in functions.		
92.05	Declare variables in modules and procedures.		
92.06	Declare arrays, and initialize elements of arrays.		
92.07	Declare and use object variables and collections, and use their associated properties and methods.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	92.08 Declare symbolic constants, and make them available locally or publicly.		
	92.09 Write JSP pages to process user input.		
	92.10 Write Servlets to provide input and output processing for the web solution.		
93.0	Write code to perform common and union database queries using SQL and Java. – The student will be able to:		
	93.01 Utilize SQL to write common queries.		
	93.02 Refer to objects by using SQL.		
	93.03 Utilize union queries.		
94.0	Implement Java program statements using objects. – The student will be able to:		
	94.01 Determine when to use data access objects.		
	94.02 Differentiate between objects and collections.		
	94.03 Write statements that access and modify database objects, EJB objects.		
	94.04 Select appropriate methods and property settings for use with specified objects.		
95.0	Utilize debugging tools and write error handlers. – The student will be able to:		
	95.01 Trap errors.		
	95.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.		
	95.03 Debug code samples.		
	95.04 Utilize the Debugger to monitor variable values.		
	95.05 Write an error handler.		
96.0	Demonstrate file input/output (I/O). – The student will be able to:		
	96.01 Read from sequential and random access files.		
	96.02 Write to sequential and random access files.		
	96.03 Use file serialization.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
97.0 Utilize API functions. – The student will be able to:		
97.01 Properly declare functions.		
97.02 Use the by value and by reference parameters.		
98.0 Test and debug databases. – The student will be able to:		
98.01 Implement error handling.		
98.02 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
99.0 Successfully work as a member of a software development team. – The student will be able to:		
99.01 Accept responsibility for specific tasks in a given situation.		
99.02 Document progress, and provide feedback on work accomplished in a timely manner.		
99.03 Complete assigned tasks in a timely and professional manner.		
99.04 Reassign responsibilities when the need arises.		
99.05 Complete daily tasks as assigned on one's own initiative.		
100.0 Manage time according to a plan. – The student will be able to:		
100.01 Set realistic time frames and schedules.		
100.02 Keep a written time sheet of work accomplished on a daily basis.		
100.03 Meet goals and objectives set by the team.		
100.04 Identify individual priorities.		
100.05 Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities as needed.		
101.0 Keep acceptable records of progress problems and solutions. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
101.01 Develop a record keeping system in the form of a log book to record daily progress.		
101.02 Use a project journal to identify problem statement.		
101.03 Develop a portfolio of work accomplished to include design drawings, flowcharts, drawings and plans, and prototypes.		
102.0 Plan, organize, and carry out a project plan. – The student will be able to:		
102.01 Determine the scope of a project.		
102.02 Organize the team according to individual strengths.		
102.03 Assign specific tasks within a team.		
102.04 Determine project priorities.		
102.05 Identify required resources.		
102.06 Plan research, design, development, and evaluation activities as required.		
102.07 Carry out the project plan to successful completion.		
103.0 Manage resources. – The student will be able to:		
103.01 Identify required resources for each stage of the project plan.		
103.02 Determine the methods needed to acquire needed resources.		
103.03 Demonstrate good judgment in the use of resources.		
103.04 Recycle and reuse resources where appropriate.		
103.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.		
104.0 Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:		
104.01 Identify the proper tool for a given job.		
104.02 Use tools and machines in a safe manner.		
104.03 Adhere to laboratory or job site safety rules and procedures.		
104.04 Identify the application of processes appropriate to the task at hand.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
104.05	Identify materials appropriate to their application.		
105.0	Demonstrate an understanding of the software development process. – The student will be able to:		
105.01	State the goals of the software application clearly.		
105.02	Identify and write a plan to achieve each goal.		
105.03	Develop a list of materials and content required for each goal.		
105.04	Develop a step by step procedure for developing the application.		
105.05	Follow a written procedure.		
105.06	Record data from evaluation activities.		
105.07	Document conclusions and solutions based on evaluation results, observations and data.		
105.08	Document progress using a project log.		
105.09	Write an abstract describing the project plan.		
106.0	Research content related to the project and document the results following industry conventions. – The student will be able to:		
106.01	Identify the basic research needed to develop the project plan.		
106.02	Identify available resources for completing background research required in the project plan.		
106.03	Demonstrate the ability to locate resource materials in a library, data base, internet and other research resources.		
106.04	Demonstrate the ability to organize information retrieval.		
106.05	Demonstrate the ability to prepare a topic outline.		
106.06	Write a draft of the research report.		
106.07	Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.		
106.08	Prepare an electronically composed research paper in proper form.		
106.09	Conduct an alpha and beta evaluation of the project's product.		
106.10	Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
107.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:		
107.01	Prepare a multi-media presentation on the completed project.		
107.02	Make an oral presentation, using multi-media materials.		
107.03	Review the presentation, and make changes in the delivery method(s) to improve presentation skills.		
108.0	Demonstrate competency in the area of expertise related to developing computer software using the Java programming language. – The student will be able to:		
108.01	Demonstrate a mastery of the content of the selected subject area.		
108.02	Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.		
108.03	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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. Secondary or postsecondary students who have previously completed the Software Development Core will not have to repeat the core. 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	Introduction to Information Technology	1 credit	15-1151	2	VO
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	9007310 9007320 9007330 9007340	Database Design & SQL Programming SQL Extension Languages I SQL Extension Languages II Custom Database Programming	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

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	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%
9007330	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	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
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%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007220	14/67 21%	10/75 13%	11/54 20%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007230	11/67 16%	8/75 11%	11/54 20%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007310	3/67 4%	4/75 5%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007320	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007330	0/67 0%	0/75 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.

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 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 Demonstrate comprehension and communication skills.
06.0 Use technology to enhance the effectiveness of communication skills.
07.0 Develop an awareness of management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Practice quality performance in the learning environment and the workplace.
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 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
11.0 Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals.
12.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
13.0 Demonstrate human relations/interpersonal skills appropriate for the workplace.
14.0 Participate in work-based learning experiences.
15.0 Perform e-mail activities.
16.0 Demonstrate knowledge of different operating systems.
17.0 Demonstrate proficiency navigating the internet, intranet, and the WWW.
18.0 Demonstrate proficiency using HTML commands.
19.0 Demonstrate proficiency in page design applicable to the WWW.
20.0 Demonstrate proficiency using specialized web design software.
21.0 Develop an awareness of the information technology industry.
22.0 Develop an awareness of microprocessors and digital computers.
23.0 Develop an awareness of programming languages.
24.0 Develop an awareness of emerging technologies.
25.0 Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model.
26.0 Demonstrate proficiency using common software applications.
27.0 Demonstrate proficiency using specialized software applications
28.0 Demonstrate language arts knowledge and skills.
29.0 Demonstrate mathematics knowledge and skills.
30.0 Demonstrate science knowledge and skills.
01.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.

02.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
03.0 Distinguish between iterative and non-iterative program control structures.
04.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
05.0 Describe the processes, methods, and conventions for software development and maintenance.
06.0 Explain the types, uses, and limitations of testing for ensuring quality control.
07.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
08.0 Describe information security risks, threats, and strategies associated with software development.
09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
10.0 Solve problems using critical thinking skills, creativity and innovation.
11.0 Use information technology tools.
12.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database Application Development & Programming.
13.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Database Application Development & Programming.
14.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Database Application Development & Programming.
15.0 Design a computer program to meet specific physical, operational, and interaction criteria.
16.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
17.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
18.0 Create a unit test plan, implement the plan, and report the results of testing.
19.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
20.0 Describe the importance of professional ethics and legal responsibilities.
21.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
22.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
23.0 Design, document, and create object-oriented computer programs.
24.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
25.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
26.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
27.0 Develop the process of creating an entity by identifying relationships.
28.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
29.0 Consider the degree and optionality of relationships of entities.
30.0 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.
31.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
32.0 Demonstrate proficiency in designing and adding complexity to an entity-relationship model (ERM).
33.0 Apply complex ERM information by fine-tuning entities and the process for relating them.
34.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
35.0 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.
36.0 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.

37.0 Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database.
38.0 Extend the logical model presentation model by normalizing the data and mapping the management system.
39.0 Apply techniques for building a storage management system by creating a website using templates and wizards.
40.0 Demonstrate design and functionality by constructing a group business presentation.
41.0 Demonstrate comprehension of database modeling competency through group presentation.
42.0 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.
43.0 Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements.
44.0 Demonstrate proficiency working with columns, characters, and rows in SQL.
45.0 Demonstrate proficiency in using SQL comparison operators.
46.0 Demonstrate proficiency in using logical comparisons and precedence rules.
47.0 Demonstrate proficiency using SQL single row functions.
48.0 Demonstrate proficiency displaying data from multiple tables.
49.0 Demonstrate proficiency aggregating data using group functions.
50.0 Demonstrate proficiency utilizing subqueries.
51.0 Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language.
52.0 Demonstrate proficiency creating and managing database objects.
53.0 Demonstrate proficiency altering tables and constraints implementing views.
54.0 Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects.
55.0 Demonstrate ability to control user access and SQL language interface and reporting tool.
56.0 Demonstrate comprehension of bundling features of SQL.
57.0 Demonstrate comprehension working with composite data types by writing executable script files.
58.0 Describe the differences between SQL and SQL extension languages.
59.0 Create program blocks.
60.0 Use variables in program blocks.
61.0 Recognize lexical units.
62.0 Recognize data types.
63.0 Use scalar data types.
64.0 Use various types of joins.
65.0 Use SQL group functions and subqueries.
66.0 Write executable statements.
67.0 Use nested blocks and variable scope.
68.0 Use good programming practices.
69.0 Write DML statements to manipulate data.
70.0 Retrieve data.
71.0 Manipulate data.
72.0 Use transaction control statements.
73.0 Use IF conditional control statements.
74.0 Use CASE conditional control statements.
75.0 Use basic LOOP iterative control statements.
76.0 Use WHILE and FOR loop iterative control statements.
77.0 Use nested loop iterative control statements.

78.0 Use explicit cursors.
79.0 Use explicit cursor attributes.
80.0 Use cursor FOR loops.
81.0 Use cursors with parameters.
82.0 Use cursors for update transactions.
83.0 Use multiple cursors.
84.0 Handle exceptions.
85.0 Trap server exceptions.
86.0 Trap user-defined exceptions.
87.0 Create procedures.
88.0 Use parameters in procedures.
89.0 Pass parameters.
90.0 Create stored functions.
91.0 Use functions in SQL statements.
92.0 Manage procedures and functions.
93.0 Manage object privileges.
94.0 Use invoker's rights.
95.0 Create packages.
96.0 Manage package constructs.
97.0 Use advanced package concepts.
98.0 Manage persistent state of package variables.
99.0 Use vendor-supplied packages.
100.0 Understand dynamic SQL.
101.0 Understand triggers.
102.0 Create DML triggers.
103.0 Create DDL and database event triggers.
104.0 Manage triggers.
105.0 Use large object data types.
106.0 Manage binary types.
107.0 Manage indexes.
108.0 Manage dependencies.
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.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide an introduction to information technology concepts and careers as well as the impact information technology has on the world, people, and industry and basic web design concepts. The content includes information technology career research; operating systems and software applications; electronic communications including e-mail and Internet services; basic HTML, DHTML, and XML web commands and design; and emerging technologies and web page design. After successful completion of Introduction to Information Technology, students will have met Occupational Completion Point A, Information Technology Assistant, SOC Code 15-1151.

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 the program in which the BTE Core is associated.		
	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 the program in which the BTE Core is associated.		
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 the program in which the BTE Core is associated.		
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

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:		SC.912.L.14.12, 16, 16.10, 17.11, 13, 15, 16, 19, 20; SC.912.N.1.1, 3, 4, 7, 2.2, 5, 3.5, 4.2
04.01 Develop keyboarding skills to enter and manipulate text and data.	LAFS.910.SL.2.5, LAFS.1112.SL.2.5, LAFS.910.W.2.6, LAFS.1112.W.2.6, LAFS.910.SL.1.2, LAFS.1112.SL.1.2, LAFS.910.L.1.2, LAFS.1112.L.1.2	
04.02 Describe and use current and emerging computer technology and software to perform personal and business related tasks.	LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.910.SL.2.4, LAFS.910.SL.2.5, LAFS.910.SL.2.6, LAFS.910.W.1.2, LAFS.910.W.2.6, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112.SL.1.3, LAFS.1112.SL.2.4, LAFS.1112.SL.2.5, LAFS.1112.SL.2.6, LAFS.1112.W.1.2, LAFS.1112.W.2.6	
04.03 Identify and describe communications and networking systems used in workplace environments.	LAFS.910.RI.2.4, LAFS.1112.RI.2.4, LAFS.910.SL.1.2, LAFS.1112.SL.1.2, LAFS.910.W. 2.4, LAFS.910.W. 2.5, LAFS.910.W. 2.6, LAFS.1112.W. 2.4, LAFS.1112.W. 2.5, LAFS.1112.W. 2.6, LAFS.910.W.3.8, LAFS.1112.W.3.8	
04.04 Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.	LAFS.910.RI.1.1, LAFS.910.RI.1.2, LAFS.910.RI.1.3, LAFS.910.RI.2.4, LAFS.910.RI.2.5, LAFS.910.RI.2.6, LAFS.910.RI.3.7, LAFS.1112.RI.1.1, LAFS.1112.RI.1.2, LAFS.1112.RI.1.3, LAFS.1112.RI.2.4, LAFS.1112.RI.2.5, LAFS.1112.RI.2.6, LAFS.1112.RI.3.7, LAFS.910.RI.4.10, LAFS.1112.RI.4.10	
04.05 Troubleshoot problems with computer hardware peripherals and other office equipment.	LAFS.910.SL1.1, LAFS.1112.SL.1.1, LAFS.910.SL.2.5, LAFS.1112.SL.2.5	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	04.06 Describe ethical issues and problems associated with computers and information systems.	LAFS.910.RI.4.10, LAFS.1112.RI.4.10, LAFS.910.RI.1.1, LAFS.910.RI.1.2, LAFS.910.RI.1.3, LAFS.1112.RI.1.1, LAFS.1112.RI.1.2, LAFS.1112.RI.1.3, LAFS.910.RI.3.8, LAFS.1112.RI.3.8, LAFS.910.W.3.8, LAFS.1112.W.3.8, LAFS.910.W.1.1, LAFS.1112.W.1.1, LAFS.910.W.1.2, LAFS.1112.W.1.2, LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.910.SL.2.4, LAFS.910.SL.2.5, LAFS.910.SL.2.6, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112.SL.1.3, LAFS.1112.SL.2.4, LAFS.1112.SL.2.5, LAFS.1112.SL.2.6	
05.0	Demonstrate comprehension and communication skills – the student will be able to:		
	05.01 Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	05.02 Organize ideas and communicate oral and written messages appropriate for information technology environments.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
	05.03 Collaborate with individuals and teams to complete tasks and solve information technology problems.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	05.04 Identify, define, and discuss professional information technology terminology appropriate for internal and external communications in an information technology environment.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L 2.3, 3.4, 3.5, 3.6	
	05.05 Apply the writing process to the creation of appropriate documents following designated business formats.	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L.1.1, 1.2 LAFS.1112.L1.1, 1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
05.06	Demonstrate an awareness of project management concepts and tools (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration, etc.).	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
06.0	Use technology to enhance the effectiveness of communication skills – the student will be able to:		SC.912.N.1.1, 4, 2.2, 3.5
06.01	Use database, spreadsheet, presentation software, scheduling, and integrated software packages to enhance communication.	LAFS.910.RI.4.1 LAFS.910.W.4.1 LAFS.1112.RI.4.1 LAFS.1112.W.4.1 MAFS 912.A-CED.1.1	
06.02	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.	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L.1.1, 1.2 LAFS.1112.L1.1, 1.2	
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles – the student will be able to:		
07.01	Explore, design, implement, and evaluate organizational structures and cultures.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
07.02	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.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
07.03	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.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
08.0	Practice quality performance in the learning environment and the workplace – the student will be able to:		
08.01	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).	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
08.02	Develop criteria for assessing products and processes that incorporate effective business practices (e.g., time management,	LAFS.910.SL.1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	productivity, total quality management).		
09.0	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:		
09.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
10.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance – the student will be able to:		
10.01	Analyze, interpret, compile, and demonstrate the ability to present/communicate data in understandable and measurable terms using common statistical procedures.	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1 MAFS 912.S-ID.1.1 MAFS.9.12.A-APR.4.6 MAFS.912.A-CED.1.3 MAFS.912.S-MD.2.5 B	
10.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	SC.912.N.1.5
10.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas when appropriate.	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1 MAFS.912.A-CED.1.1, 1.3, 1.4 MAFS 912.A-REI.2.3	
11.0	Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals – the student will be able to:		
11.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1	
11.02	Analyze job and career requirements and relate career interests to opportunities in the global economy.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.0 Incorporate knowledge gained from individual assessment and job/career exploration to 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:		
12.01 Research, compare, and contrast information technology career clusters (e.g., characteristics needed, skills required, education required, industry certifications, advantages and disadvantages of information technology careers, the need for information technology workers, etc.).	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
12.02 Describe the variety of occupations and professions within the world of information technology including those where information technology is either in a primary focus or in a supportive role.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.03 Describe job requirements for the variety of occupations and professions within the global world of information technology.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.04 Analyze personal skills and aptitudes in comparison with information technology career opportunities.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.05 Refine and implement a plan to facilitate personal growth and skill development related to information technology career opportunities.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.06 Develop and maintain an electronic career portfolio, to include, but not limited to the Resume and Letter of Application.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
13.0	Demonstrate human relations/interpersonal skills appropriate for the workplace – the student will be able to:		
13.01	Accept constructive criticism.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
13.02	Demonstrate personal and interpersonal skills appropriate for the workplace (e.g., responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, professional dress, etc.).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
14.0	Participate in work-based learning experiences – the student will be able to:		
14.01	Participate in work-based learning experiences in an information technology environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
14.02	Discuss the use of technology in an information technology environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
15.0	Perform e-mail activities – the student will be able to:		SC.912.N.1.1, 4, 3.5, 4.1, 2
15.01	Describe e-mail capabilities and functions.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.02	Identify components of an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.03	Identify the components of an e-mail address.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.04	Identify when to use different e-mail options.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.05	Attach a file to an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.06	Forward an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.07	Use an address book.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.08	Reply to an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.09	Use the Internet to perform e-mail activities.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.10	Identify the appropriate use of e-mail and demonstrate related e-mail etiquette.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.11	Identify when to include information from an original e-mail message in a response.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.12	Identify common problems associated with widespread use of e-mail.	LAFS.910.W.4.1 LAFS.1112.W.4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
16.0	Demonstrate knowledge of different operating systems – the student will be able to:		
16.01	Identify operating system file naming conventions.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.03	Demonstrate a working knowledge of standard file formats.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
17.0	Demonstrate proficiency navigating the internet, intranet, and the WWW – the student will be able to:		
17.01	Identify and describe Web terminology.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.02	Demonstrate proficiency in using the basic features of GUI browsers (e.g., setting bookmarks, basic configurations, e-mail configurations, address book).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.03	Define Universal Resource Locators (URLs) and associated protocols (e.g., .com, .org, .edu, .gov, .net, .mil).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.04	Describe and observe Internet/Intranet ethics and copyright laws and regulatory control.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.05	Trace the evolution of the Internet from its inception to the present and into the future.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
17.06	Demonstrate proficiency using search engines (e.g., Yahoo!, Google).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	17.07 Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF, etc.).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.08 Identify effective Boolean search strategies.	LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
18.0	Demonstrate proficiency using HTML commands – the student will be able to:		
	18.01 Identify elements of a Web page.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
	18.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
	18.03 Define basic HTML terminology.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
	18.04 Analyze HTML source code developed by others.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.07 Edit and test HTML documents for accuracy and validity.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.08 Use basic functions of WYSIWYG editors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5,	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
	18.09 Use basic functions of HTML, DHTML, and XML editors and converters.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
	18.10 Enhance web pages through the addition of images and graphics including animation.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.0	Demonstrate proficiency in page design applicable to the WWW – the student will be able to:		
	19.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
	19.02 Describe and apply color theory as it applies to Web page design (e.g., background and text color).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.04 Use image design software to create and edit images.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.05 Demonstrate proficiency in publishing to the Internet.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.06 Demonstrate proficiency in adding downloadable forms to web pages.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L 2.3, 3.4, 3.5, 3.6	
19.07 Explain the need for web-based applications.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
20.0 Demonstrate proficiency using specialized web design software – the student will be able to:		
20.01 Compare and contrast various specialized web design software (e.g., Flash, Shockwave, GoLive, Director, etc.).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
20.02 Demonstrate proficiency using use of various specialized web design software (e.g., Flash, Shockwave, GoLive, Director, etc.).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
21.0 Develop an awareness of the information technology industry – the student will be able to:		
21.01 Explain how information technology impacts the operation and management of business and society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
21.02 Explain the emergence of e-commerce and e-government and the potential impact on business and society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
21.03 Explain the emergence of a paperless society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.0 Develop an awareness of microprocessors and digital computers – the student will be able to:		
22.01 Describe the evolution of the digital computer.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.02 Explain the general architecture of a microcomputer system.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.03 Explain the evolution of microprocessors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.04 Explain software hierarchy and its impact on microprocessors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.05 Explain the need for and use of peripherals.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.06 Demonstrate proficiency using peripherals.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.07 Identify the basic concepts of computer maintenance and upgrades.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.08 Differentiate between diagnosing and troubleshooting.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.0 Develop an awareness of programming languages – the student will be able to:		
23.01 Explain the history of programming languages.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.02 Explain the need for and use of compilers.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	23.03 Explain how compilers work.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	23.04 Identify the three types of programming design approaches (e.g., top-down, structured, and object-oriented).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
24.0	Develop an awareness of emerging technologies – the student will be able to:		
	24.01 Compare and contrast various methods of evaluation for emerging technologies.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	24.02 Demonstrate knowledge of the process of planning upgrades and changeovers.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	24.03 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,	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5,	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	home networks, peer-to-peer, etc.).	2.6, 3.7, 3.8, 3.9, 4.1	
25.0	Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model – the student will be able to:		
25.01	Identify how types of networks and how they work.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.02	Identify the role of servers and clients on a network.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.03	Identify benefits and risks of networked computing.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.04	Identify the relationship between computer networks and other communications networks (i.e. telephone systems).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.05	Identify Intranets, Extranets and how they relate to the Internet.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.06	Demonstrate basic understanding of network administration.	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.4.1 LAFS.1112.W4.1 LAFS.910.L.2.3, 3.4, 3.6 LAFS.1112.L.2.3, 3.4, 3.6	
25.07	Describe the evolution of OSI from its inception to the present and into the future.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.08	Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.4.1 LAFS.1112.W4.1 LAFS.910.L.2.3, 3.4, 3.6 LAFS.1112.L.2.3, 3.4, 3.6	
26.0	Demonstrate proficiency using common software applications – the student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
26.01	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, etc.).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	SC.912.N.1.1, 3, 4, 6, 7, 3.5, 4.2; SC.912.P.10.18
26.02	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, etc.).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	SC.912.N.1.1, 3, 4, 1.7, 3.5;
27.0	Demonstrate proficiency using specialized software applications – the student will be able to:		
27.01	Compare and contrast the appropriate use of specialized software applications (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation process control, materials management, etc.).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
27.02	Demonstrate awareness of specialized software applications (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation, process control, materials management, etc.)	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
27.03	Demonstrate the ability to incorporate digital sound.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

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	

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 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	

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 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
31.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:		
31.01 Describe the evolution of programming and programming careers.		
31.02 Identify tasks performed by programmers.		
31.03 Describe how businesses use computer programming to solve business problems.		
31.04 Investigate job opportunities in the programming field.		
31.05 Explain different specializations and the related training in the computer programming field.		
31.06 Explain the need for continuing education and training of computer programmers.		
31.07 Explain enterprise software systems and how they impact business.		
31.08 Describe ethical responsibilities of computer programmers.		
31.09 Describe the role of customer support to software program quality.		
31.10 Identify credentials and certifications that may improve employability for a computer programmer.		
31.11 Identify devices, tools, and other environments for which programmers may develop software.		
32.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:		
32.01 Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.		
32.02 Explain the types and uses of variables in programs.		
32.03 Determine the best data type to use for given programming problems.		
32.04 Identify the types of operations that can be performed on different data types.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
32.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.		
32.06	Explain how computers store different data types in memory.		
32.07	Demonstrate the difference between "data" and "information".		
32.08	Use different number systems to represent data.	MAFS.912.N-Q.1.1	
32.09	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.		
32.10	Use Boolean logic to perform logical operations.		
33.0	Distinguish between iterative and non-iterative program control structures–The student will be able to:		
33.01	Explain non-iterative programming structures (*e.g.*, if, if/else and their uses.		
33.02	Explain iterative programming structures (*e.g.*, while, do/while) and their uses.		
34.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:		
34.01	Identify the characteristics, uses, and limits of low-level programming languages.		
34.02	Identify the characteristics, uses, and limits of high-level programming languages.		
34.03	Identify the characteristics, uses, and limits of rapid development programming languages.		
34.04	Describe object-oriented concepts.		
34.05	Explain the characteristics of procedural and object-oriented programming languages.		
34.06	Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).		
35.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:		
35.01	Describe and explain tools used in software development.		
35.02	Describe the stages of the program life cycle.		
35.03	Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).		
35.04	List and explain the steps in the program development cycle.		
35.05	Describe different types of documentation used in the program development cycle (*e.g.*,		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	requirements document, program design documents, test plans).		
35.06	Describe the on-going need for program maintenance.		
35.07	Describe different methods companies use to facilitate program updates for enhancements and defects (*e.g.*, how customers receive patches, updates, new versions, upgrades).		
35.08	Describe different methods used to facilitate version control and change management.		
36.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:		
36.01	Explain the uses and limits of testing in ensuring program quality.		SC.912.N.1.1
36.02	Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).		
36.03	Describe data and the use of test plans/scripts to be used in program testing.		SC.912.N.1.1
36.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).		
36.05	Identify the data to be used for boundary conditions.		
36.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.		SC.912.N.1.1
37.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:		
37.01	Describe different design methodologies and their uses (*e.g.*, object-oriented design, structured design, and rapid application development).		SC.912.N.1.1, SC.912.N.3.5
37.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).		SC.912.N.1.1
37.03	Explain the role of existing libraries and packages in facilitating programmer productivity.		
37.04	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).		SC.912.N.1.1, SC.912.N.1.3, SC.912.N.2.4, SC.912.N.4.2
37.05	Write a program design document using UML or other standard design methodology.		
37.06	Define input and output for a program module using UML or other standard design methodology.		
38.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	38.01 Explain the security risks to personal and business computer users.		
	38.02 Identify different types of threats to computer systems.		
	38.03 Identify methods to protect against different threats to computer systems.		
	38.04 Understand the importance of a disaster/emergency response plan.		
	38.05 Identify alternative methods for data storage and backup (*e.g.*, mirroring, fail-over, high availability, types of backups).		
39.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
	39.01 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
	39.02 Locate, organize and reference written information from various sources.		SC.912.N.1.1.6
	39.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.		SC.912.N.1.1.9, SC.912.N.1.1.10
	39.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.		SC.912.N.1.1.5, SC.912.N.1.1.6, SC.912.N.1.1.8
	39.05 Apply active listening skills to obtain and clarify information.		
	39.06 Develop and interpret tables and charts to support written and oral communications.	MAFS.912.F-IF.3.9	SC.912.N.1.1.6-11
	39.07 Exhibit public relations skills that aid in achieving customer satisfaction.		
40.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
	40.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.		SC.912.N.1.1
	40.02 Employ critical thinking and interpersonal skills to resolve conflicts.		SC.912.N.1.3, SC.912.N.4.1
	40.03 Identify and document workplace performance goals and monitor progress toward those goals.		
	40.04 Conduct technical research to gather information necessary for decision-making.		SC.912.N.1.3, SC.912.N.1.1.5
41.0	Use information technology tools. – The student will be able to:		
	41.01 Use personal information management (PIM) applications to increase workplace efficiency.		
	41.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email,		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	and internet applications.		
41.03	Employ computer operations applications to access, create, manage, integrate, and store information.		
41.04	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 #
42.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database Application Development & Programming.		
42.01	Key Ideas and Details		
	42.01.1	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	
	42.01.2	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	
	42.01.3	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	
42.02	Craft and Structure		
	42.02.1	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	
	42.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	42.02.3	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	
42.03	Integration of Knowledge and Ideas		
	42.03.1	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	
	42.03.2	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	
	42.03.3	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	
42.04	Range of Reading and Level of Text Complexity		
	42.04.1	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.	
	42.04.2	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	
43.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Database Application Development & Programming.		
43.01	Text Types and Purposes		
	43.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	43.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
43.02	Production and Distribution of Writing		
	43.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	43.02.2	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	
	43.02.3	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	
	43.03	Research to Build and Present Knowledge	
	43.03.1	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	
	43.03.2	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	
	43.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	43.04	Range of Writing	
	43.04.1	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	
44.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Database Application Development & Programming.		
	44.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	44.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	44.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	44.04	Model with mathematics. MAFS.K12.MP.4.1	
	44.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	44.06	Attend to precision. MAFS.K12.MP.6.1	
	44.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
44.08 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
45.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:		
45.01	Choose appropriate data types depending on the needs of the program.		
45.02	Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).		
45.03	Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).		
45.04	Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).		
45.05	Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).		
46.0	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:		
46.01	Use appropriate naming conventions to define program variables and modules (methods, functions).		
46.02	Use a program editor to write the source code for a program.		
46.03	Write programs that use selection structures (*e.g.*, if, if/else).		
46.04	Write programs that use repetition structures (*e.g.*, while, do/while).		
46.05	Write programs that use nested structures.		
46.06	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.		
46.07	Compile and run programs.		
46.08	Write programs that use standard arithmetic operators with different numerical data types.	MAFS.912.N-Q.1.1, MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
46.09	Write programs that use standard logic operators.		
46.10	Write programs that use a variety of common data types.	MAFS.912.N-Q.1.1, MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
46.11	Write programs that perform data conversion between standard data types.		
46.12	Write programs that define, use, search, and sort arrays.		
46.13	Write programs that use user-defined data types.		
46.14	Demonstrate understanding and use of appropriate variable scope.		
47.0	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:		
47.01	Write programs that perform user input and output.		
47.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).		
47.03	Write program modules such as functions, subroutines, or methods.		
47.04	Write program modules that accept arguments.		
47.05	Write program modules that return values.		
47.06	Write program modules that validate arguments and return error codes.		
47.07	Write interactive programs.		
47.08	Write programs that use standard libraries to enhance program function.		
47.09	Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.		
48.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:		
48.01	Write a unit test plan that identifies the input data and expected results for program tests.		SC.912.N.1.1
48.02	Test and debug programs, including programs written by others.		
48.03	Write a test report that identifies the results of testing.		SC.912.N.1.1
48.04	Trace through the function of a program to ensure valid operation.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	48.05 Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).	MAFS.912.N-Q.1.2	
	48.06 Create a disaster/emergency response plan for a computer system.		
49.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
	49.01 Employ leadership skills to accomplish organizational goals and objectives.		
	49.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
	49.03 Conduct and participate in meetings to accomplish work tasks.		
50.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
	50.01 Evaluate and justify decisions based on ethical reasoning.		
	50.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.		
	50.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.		

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 #
42.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Database Application Development & Programming.		
42.01	Key Ideas and Details		
	42.01.1	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	
	42.01.2	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	
	42.01.3	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	
42.02	Craft and Structure		
	42.02.1	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	
	42.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	42.02.3	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	
42.03	Integration of Knowledge and Ideas		
	42.03.1	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	
	42.03.2	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	
	42.03.3	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	
42.04	Range of Reading and Level of Text Complexity		
	42.04.1	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.	
	42.04.2	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	
43.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Database Application Development & Programming.		
43.01	Text Types and Purposes		
	43.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	43.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
43.02	Production and Distribution of Writing		
	43.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	43.02.2	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	
	43.02.3	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	
	43.03	Research to Build and Present Knowledge	
	43.03.1	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	
	43.03.2	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	
	43.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	43.04	Range of Writing	
	43.04.1	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	
44.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Database Application Development & Programming.		
	44.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	44.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	44.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	44.04	Model with mathematics. MAFS.K12.MP.4.1	
	44.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	44.06	Attend to precision. MAFS.K12.MP.6.1	
	44.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
44.08 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
51.0 Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:		
51.01 Demonstrate the understanding and use of classes, objects, attributes, and behaviors.		
51.02 Demonstrate the understanding and use of inheritance.		
51.03 Demonstrate the understanding and use of data encapsulation.		
51.04 Demonstrate the understanding and use of polymorphism.		
52.0 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:		
52.01 Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.		
52.02 Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.		
52.03 Design an object-oriented program using UML or another standard design methodology.		
52.04 Work with other team members to develop a project plan for a program.		
52.05 Work with other team members to write a design document for a program with multiple functions and shared data.		
52.06 Participate in design meetings that review program design documents for conformance to program requirements.		
52.07 Estimate the time to develop a program or module.		
53.0 Design, document, and create object-oriented computer programs. – The student will be able to:		
53.01 Compare and contrast recursive functions to other iterative methods.		
53.02 Understand the implementation of character strings in the programming language.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
53.03	Write programs that perform string processing (*e.g.*, string manipulation, string compares, concatenation).		
53.04	Write programs that use user-defined data types.		
53.05	Write object-oriented programs that use inheritance.		
53.06	Write object-oriented programs that use polymorphism.		
53.07	Develop class constructors.		
53.08	Write programs that define and use program constants.		
53.09	Write programs that perform error handling.		
53.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.		
53.11	Write programs that perform dynamic memory allocation.		
53.12	Write programs that perform effective management of dynamically allocated memory.		
53.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal, external) related to version control.		
53.14	Write programs that use complex data structures (*e.g.*, stacks, queues, trees, linked lists).		
53.15	Write programs that are event-driven.		
53.16	Write programs that perform file input and output (*i.e.*, sequential and random access file input/output).		
53.17	Perform basic database commands including connect, open, select, and close.		
54.0	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:		
54.01	Develop a test plan for an object-oriented program.		SC.912.N.1.1
54.02	Write test plans for event-driven programs.		SC.912.N.1.1
54.03	Write test plans for programs that perform file input and output.		SC.912.N.1.1
54.04	Perform test and debug activities on object-oriented programs, including those written by someone else.		
54.05	Perform test and debug activities on an event-driven program.		
54.06	Perform test and debug activities on programs that perform file input and output and		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	verify the correctness of output files.		
54.07	Document the findings of testing in a test report.		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
55.0	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:		
55.01	Cite examples of jobs, salary, and opportunities he/she will have as a database programmer.		
55.02	Describe the role a database plays in a business.		
55.03	Understand the importance of clear communication when discussing business informational requirements.		
55.04	Identify important historical contributions in database development and design.		
56.0	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:		
56.01	Identify and analyze the phases of the database development process.		
56.02	Explain what logical data modeling and database design involve.		
56.03	Compare database development process with that of the application development process.		
56.04	Distinguish between a logical model and a physical implementation.		
57.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:		
57.01	Identify and model various types of entities.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	57.02 Identify naming and drawing conventions for entities.		
	57.03 Sequence the steps that are necessary for creation of an entity.		
	57.04 Analyze and model the relationships between entities.		
58.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:		
	58.01 Analyze and model attributes.		
	58.02 Identify unique identifiers for each entity.		
	58.03 Develop an entity relationship diagram tagging attributes with optionality.		
59.0	Consider the degree and optionality of relationships of entities. – The student will be able to:		
	59.01 Create entity relationship models based on information requirements and interviews.		
	59.02 Differentiate between one-to-many, many-to-many and one-to-one relationships.		
	59.03 Identify relationship between two entities by reading a given diagram.		
	59.04 Create a relationship between instances of the same entity.		
	59.05 Read an entity relationship model in order to validate it.		
60.0	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:		
	60.01 Identify the significance of an attribute that has more than one value for each entity instance.		
	60.02 Evaluate appropriate methods of storing validation rules for attributes.		
	60.03 Recognize unique identifiers inherited from other entities.		
	60.04 Sequence the steps involved in resolving a many-to-many relationship.		
61.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:		
	61.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).		
	61.02 Resolve many-to-many relationships with intersection entities.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	61.03 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.		
	61.04 Create exclusive entities and relationships by using subtypes and arcs, respectively.		
	61.05 Identify initial layout for presentation and generate a list of action items for members of group.		
	61.06 Develop an entity relationship model using subtypes, super-types and an exclusive arc.		
62.0	Demonstrate proficiency in designing and adding complexity to an entity-relationship model (ERM). – The student will be able to:		
	62.01 Revise an entity relationship model according to client requirements.		
	62.02 Define and give examples of hierarchical and recursive relationships.		
	62.03 Differentiate between transferable and non-transferable relationships.		
	62.04 Deliver a professional, formal business style presentation.		
	62.05 Evaluate and critique presentation layout, design and performance.		
	62.06 Construct a model using both recursion and hierarchies to express the same logical meaning.		
63.0	Apply complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:		
	63.01 Describe a relational database and how it differs from other database systems.		
	63.02 Define primary keys and foreign keys and describe their purpose.		
	63.03 Describe what data integrity refers to and list some constraints.		
	63.04 Explain how database design fits into the database development process.		
	63.05 Translate an entity-relationship model into a relational database design.		
	63.06 Document a database design using table instance charts.		
64.0	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:		
	64.01 Demonstrate ability to implement steps for mapping entity relationship models for implementation.		
	64.02 Document an initial database design on table instance charts.		
	64.03 Recognize raw data and evaluate the steps for creating a data group in unnormalized		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	form (UNF).		
65.0	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:		
65.01	Differentiate between unnormalized data and normalized.		
65.02	Move data from an unnormalized form through to a third normal form.		
65.03	Demonstrate ability to test data groups for third normal form compliance.		
65.04	Identify optimized data groups from given groups of normalized data.		
66.0	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:		
66.01	Compare the normalization and entity relationship modeling (ERM) techniques in terms of strengths and weaknesses.		
66.02	Further define normalization and explain its benefits.		
66.03	Place tables in third normal form.		
66.04	Explain how logical data modeling rules ensure normalized tables.		
66.05	Specify referential integrity constraints and design indices.		
67.0	Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database. – The student will be able to:		
67.01	Evaluate the transformation of business requirements into an initial layout and design for a database.		
67.02	Construct simple web page design for personal work folder.		
67.03	Evaluate existing web sites and determine quality of design.		
68.0	Extend the logical model presentation model by normalizing the data and mapping the management system. – The student will be able to:		
68.01	Formulate a plan of action for the Database Project using skills previously learned in this course.		
68.02	Normalize a logical model to the third normal form (3NF).		
68.03	Create a table in the database using a database authoring tool.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	68.04 Demonstrate ability to edit tables using a database authoring tool.		
	68.05 Create forms that will display the table components created with a database authoring tool.		
69.0	Apply techniques for building a storage management system by creating a website using templates and wizards. – The student will be able to:		
	69.01 Create a web site that displays the database project home.		
	69.02 Link a web site to create a web-enabled interface to the industry database.		
	69.03 Edit the forms created and specify appropriate field labels for data entry.		
70.0	Demonstrate design and functionality by constructing a group business presentation. – The student will be able to:		
	70.01 Evaluate and generate criteria for a formal, business presentation.		
	70.02 Construct a persuasive group presentation using the guidelines set forth in class.		
71.0	Demonstrate comprehension of database modeling competency through group presentation. – The student will be able to:		
	71.01 Deliver a formal business presentation for the class that discusses an entity-relationship model and initial database design.		
	71.02 Demonstrate the functionality of the database and the layout/design capabilities of a database authoring tool.		
	71.03 Prepare appropriate end-user documentation.		
	71.04 Self-assess learning experience through the presentation and demonstration of their final database project.		
72.0	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:		
	72.01 Identify the structural elements of a relational database table.		
	72.02 List and describe the system development life cycle.		
	72.03 Describe the industry implementation of the relational database management system (RDBMS) and object relational database management system (ORDBMS).		
	72.04 Explain how SQL and languages that extend SQL are used in the industry product set.		
	72.05 Identify the advantages of a database management system.		
73.0	Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	73.01 List the capabilities of SQL SELECT statements.		
	73.02 Execute a basic select statement.		
	73.03 Differentiate between SQL statements and language commands that extend SQL.		
74.0	Demonstrate proficiency working with columns, characters, and rows in SQL. – The student will be able to:		
	74.01 Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.		
	74.02 Use column aliases to rename columns in the query result.		
	74.03 Eliminate duplicate rows in the query result.		
	74.04 Display the structure of a table.		
	74.05 Apply SQL syntax to restrict the rows returned from a query.		
	74.06 Demonstrate application of the WHERE clause syntax.		
	74.07 Construct and produce output using a SQL query containing character strings and date values.		
75.0	Demonstrate proficiency in using SQL comparison operators. – The student will be able to:		
	75.01 Apply the proper comparison operator to return a desired result.		
	75.02 Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result.		
	75.03 Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable.		
	75.04 Explain the use of comparison conditions and NULL.		
76.0	Demonstrate proficiency in using logical comparisons and precedence rules. – The student will be able to:		
	76.01 Evaluate logical comparisons to restrict the rows returned based on two or more conditions.		
	76.02 Apply the rules of precedence to determine the order in which expressions are evaluated and calculated.		
	76.03 Construct a query to order a results set for single or multiple columns.		
	76.04 Construct a query to sort a results set in ascending or descending order.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
77.0	Demonstrate proficiency using SQL single row functions. – The student will be able to:		
77.01	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	
77.02	Modify individual data items.		
77.03	Use character, number and date functions in SELECT statements.		
77.04	Format data and numbers for display purposes.		
77.05	Convert column data types.		
78.0	Demonstrate proficiency displaying data from multiple tables. – The student will be able to:		
78.01	Construct select statements to access data from more than one table using equity and non-equality joins.		
78.02	Use outer joins through viewing data that generally does not meet a join condition.		
78.03	Join a table to itself.		
79.0	Demonstrate proficiency aggregating data using group functions. – The student will be able to:		
79.01	Identify the available group functions and describe their use.		
79.02	Demonstrate the ability to group data through the use of the GROUP BY clause.		
79.03	Demonstrate the ability to include or exclude grouped rows by using the HAVING clause.		
80.0	Demonstrate proficiency utilizing subqueries. – The student will be able to:		
80.01	Write a query with an embedded subquery.		
80.02	Evaluate and perform a multiple-column subquery.		
80.03	Describe and explain the behavior of subqueries when null values are retrieved.		
80.04	Create a subquery in a FROM clause.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
81.0	Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language. – The student will be able to:		
81.01	Produce queries that require an input variable.		
81.02	Customize the SQL language interface and reporting environment using SET commands for control.		
81.03	Produce more readable output through the use of the column and break commands.		
81.04	Describe data manipulation language (DML) and describe various DML statements.		
81.05	Utilize data manipulation language (DML) through inserting, updating and deleting rows from a table.		
81.06	Control transactions using COMMIT and ROLLBACK statements.		
82.0	Demonstrate proficiency creating and managing database objects. – The student will be able to:		
82.01	Describe the main database objects.		
82.02	Create tables and alter their definitions.		
82.03	Describe the data types that can be used when specifying column definition.		
83.0	Demonstrate proficiency altering tables and constraints implementing views. – The student will be able to:		
83.01	Create, drop, rename and truncate tables using SQL.		
83.02	Identify and describe various constraints including not null, unique, primary key, foreign key, and check.		
83.03	Create and maintain constraints including adding, dropping, enabling, disabling, and cascading.		
83.04	Recognize views and explain how they are created, how they retrieve data and how they perform DML operations.		
84.0	Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects. – The student will be able to:		
84.01	Create views, retrieve data through a view, alter the definition of a view and drop a view.		
84.02	Categorize information by using Top-N queries to retrieve specified data.		
84.03	Identify the features of a sequence and display sequence values using a data dictionary view.		
84.04	Identify the characteristics of a cached sequence.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	84.05 Modify and remove a sequence using a SQL statement.		
	84.06 Identify the features of private and public synonyms.		
	84.07 Identify characteristics of an index and describe different types.		
	84.08 Create and remove an index using a SQL statement.		
85.0	Demonstrate ability to control user access and SQL language interface and reporting tool. – The student will be able to:		
	85.01 Identify the features of database security.		
	85.02 Create users using SQL statements.		
	85.03 Grant and revoke object privileges using a SQL language interface and reporting tool.		
86.0	Demonstrate comprehension of bundling features of SQL. – The student will be able to:		
	86.01 List and describe the benefits of extension languages to SQL.		
	86.02 Recognize the basic SQL block and its sections.		
	86.03 Declare SQL variables and describe their significance.		
	86.04 Execute a SQL block.		
87.0	Demonstrate comprehension working with composite data types by writing executable script files. – The student will be able to:		
	87.01 Recognize the significance of the executable section and decide when to use it.		
	87.02 Write statements in the executable section.		
	87.03 Describe the rules of nested blocks.		
	87.04 Identify and utilize appropriate coding conventions.		
	87.05 Create a script that will select, insert, and update 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
88.0	Describe the differences between SQL and SQL extension languages. – The student will be able to:		
88.01	Describe SQL extension languages.		
88.02	Differentiate between SQL and SQL extension languages.		
88.03	Explain the need for and benefits of SQL extension languages.		
89.0	Create program blocks. – The student will be able to:		
89.01	Describe the structure of a program block.		
89.02	Identify the different types of program blocks.		
89.03	Identify program programming environments.		
89.04	Create and execute an anonymous block.		
89.05	Output messages in program blocks.		
90.0	Use variables in program blocks. – The student will be able to:		
90.01	Describe how variables are used in program blocks.		
90.02	Identify the syntax for using variables.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
90.03 Declare and initialize variables.		
90.04 Assign new values to variables.		
91.0 Recognize lexical units. – The student will be able to:		
91.01 Describe the types of lexical units.		
91.02 Describe identifiers and identify valid and invalid identifiers.		
91.03 Describe and identify reserved words, delimiters, literals, and comments.		
92.0 Recognize data types. – The student will be able to:		
92.01 Describe the data type categories.		
92.02 Give examples of scalar, composite, and large object (LOB) data types.		
92.03 Identify when an object becomes eligible for garbage collection.		
93.0 Use scalar data types. – The student will be able to:		
93.01 Declare and use scalar data types.		
93.02 Define guidelines for declaring and initializing variables.		
94.0 Use various types of joins. – The student will be able to:		
94.01 Construct and execute SELECT statements using an equijoin.		
94.02 Construct and execute SELECT statements using a non-equijoin.		
94.03 Construct and execute SELECT statements using an outer join.		
94.04 Construct and execute SELECT statements that result in a Cartesian product.		
95.0 Use SQL group functions and subqueries. – The student will be able to:		
95.01 Construct and execute an SQL query using group functions to determine a sum total, an average amount, and a maximum value.		
95.02 Construct and execute an SQL query that groups data based on specified criteria.		
95.03 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
95.04 Construct and execute an SQL query that contains a WHERE clause using a multiple-row subquery.		
96.0 Write executable statements. – The student will be able to:		
96.01 Construct variable assignment statements.		
96.02 Construct statements using built-in SQL functions.		
96.03 Differentiate between implicit and explicit data type conversions.		
96.04 Describe when implicit data type conversions take place.		
96.05 List the drawbacks of implicit data type conversions.		
96.06 Construct statements using functions to explicitly convert data types.		
96.07 Construct statements using operators.		
97.0 Use nested blocks and variable scope. – The student will be able to:		
97.01 Understand the scope and visibility of variables.		
97.02 Write nested blocks and qualify variables with labels.		
97.03 Describe the scope of an exception.		
97.04 Describe the effect of exception propagation in nested blocks.		
98.0 Use good programming practices. – The student will be able to:		
98.01 List examples of good programming practices.		
98.02 Insert comments into code.		
98.03 Follow formatting guidelines when writing code.		
99.0 Write DML statements to manipulate data. – The student will be able to:		
99.01 Construct and execute a statement to insert data into a table.		
99.02 Construct and execute a statement to update data in a table.		
99.03 Construct and execute a statement to delete data from a table.		
99.04 Construct and execute a statement to merge data into a table.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
100.0 Retrieve data. – The student will be able to:		
100.01 Identify SQL statements that can be directly included in an executable block.		
100.02 Construct and execute an INTO clause to hold values returned by a single-row SELECT statement.		
100.03 Construct statements that retrieve data.		
101.0 Manipulate data. – The student will be able to:		
101.01 Construct and execute statements that manipulate data with DML statements.		
101.02 Describe when to use implicit or explicit cursors.		
101.03 Create code to use SQL implicit cursor attributes to evaluate cursor activity.		
102.0 Use transaction control statements. – The student will be able to:		
102.01 Define a transaction and give an example.		
102.02 Construct and execute a transaction control statement.		
103.0 Use IF conditional control statements. – The student will be able to:		
103.01 Construct and use an IF statement.		
103.02 Construct and use an IF-THEN-ELSIF-ELSE statement.		
103.03 Create PL/SQL to handle null conditions in an IF statement.		
104.0 Use CASE conditional control statements. – The student will be able to:		
104.01 Construct and use CASE statements.		
104.02 Construct and use CASE expressions.		
104.03 Include syntax to handle null conditions in a CASE statement.		
104.04 Include syntax to handle Boolean conditions in IF and CASE statements.		
105.0 Use basic LOOP iterative control statements. – The student will be able to:		
105.01 Describe the types of LOOP statements and their uses.		
105.02 Create a program containing a basic loop and an EXIT statement.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
105.03 Create a program containing a basic loop and an EXIT statement with conditional termination.		
106.0 Use WHILE and FOR loop iterative control statements. – The student will be able to:		
106.01 Construct and use the WHILE looping construct.		
106.02 Construct and use the FOR looping construct.		
106.03 Describe when a WHILE loop is used.		
106.04 Describe when a FOR loop is used.		
107.0 Use nested loop iterative control statements–The student will be able to:		
107.01 Construct and execute a program using nested loops.		
107.02 Evaluate a nested loop construct and identify the exit point.		
108.0 Use explicit cursors. – The student will be able to:		
108.01 List the guidelines for declaring and controlling explicit cursors.		
108.02 Create code to open a cursor and fetch a piece of data into a variable.		
108.03 Use a simple loop to fetch multiple rows from a cursor.		
108.04 Create code to close a cursor.		
109.0 Use explicit cursor attributes. – The student will be able to:		
109.01 Define a record structure.		
109.02 Create code to process the row of an active set using record types in cursors.		
109.03 Use cursor attributes to retrieve information about the state of an explicit cursor.		
110.0 Use cursor FOR loops. – The student will be able to:		
110.01 List and explain the benefits of using Cursor FOR loops.		
110.02 Create code to declare a cursor and manipulate it in a FOR loop.		
110.03 Create code containing a Cursor FOR loop using a subquery.		
111.0 Use cursors with parameters. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
111.01 List the benefits of using parameters with cursors.		
111.02 Create code to declare and manipulate a cursor with a parameter.		
112.0 Use cursors for update transactions. – The student will be able to:		
112.01 Create code to lock rows before an update using the appropriate clause.		
112.02 Explain the effect of using NOWAIT in an update cursor declaration.		
112.03 Create code to use the current row of the cursor in an UPDATE or DELETE statement.		
113.0 Use multiple cursors. – The student will be able to:		
113.01 Explain the need for using multiple cursors to produce multilevel reports.		
113.02 Create code to declare and manipulate multiple cursors within nested loops.		
113.03 Create code to declare and manipulate multiple cursors using parameters.		
114.0 Handle exceptions. – The student will be able to:		
114.01 Describe the advantages of including exception handling code.		
114.02 Describe the purpose of an EXCEPTION section in a program block.		
114.03 Create code to include an EXCEPTION section.		
114.04 List the guidelines for exception handling.		
115.0 Trap server exceptions. – The student will be able to:		
115.01 Distinguish between errors defined by the server and those defined by the programmer.		
115.02 Differentiate between errors that are handled implicitly and explicitly by the server.		
115.03 Write code to trap a predefined server error.		
115.04 Write code to trap a non-predefined server error.		
115.05 Write code to identify an exception by error code and by error message.		
116.0 Trap user-defined exceptions. – The student will be able to:		
116.01 Write code to name a user-defined exception.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
116.02 Write code to raise an exception.		
116.03 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
117.0 Create procedures. – The student will be able to:		
117.01 Differentiate between anonymous blocks and subprograms.		
117.02 Identify the benefits of using subprograms.		
117.03 Describe a stored procedure.		
117.04 Create a procedure.		
117.05 Describe how a stored procedure is invoked.		
118.0 Use parameters in procedures. – The student will be able to:		
118.01 Describe how parameters contribute to a procedure.		
118.02 Define a parameter.		
118.03 Create a procedure using a parameter.		
118.04 Invoke a procedure that has parameters.		
118.05 Distinguish between formal and actual parameters.		
119.0 Pass parameters. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
119.01 List the types of parameter modes.		
119.02 Create a procedure that passes parameters.		
119.03 Identify methods for passing parameters.		
119.04 Describe the default option for parameters.		
120.0 Create stored functions. – The student will be able to:		
120.01 Describe the difference between a stored procedure and a stored function.		
120.02 Create a program block containing a function.		
120.03 Identify ways in which functions may be invoked.		
120.04 Create a program block that invokes a function that has parameters.		
121.0 Use functions in SQL statements. – The student will be able to:		
121.01 Describe where user-defined functions can be called from within an SQL statement.		
121.02 Describe the restrictions on calling functions from SQL statements.		
121.03 Describe the purpose of the Data Dictionary.		
121.04 Differentiate between the three types of Data Dictionary views.		
121.05 Write SQL SELECT statements to retrieve information from the Data Dictionary.		
122.0 Manage procedures and functions. – The student will be able to:		
122.01 Describe how exceptions are propagated.		
122.02 Remove a function and a procedure.		
122.03 Use Data Dictionary views to identify and manage stored procedures.		
123.0 Manage object privileges. – The student will be able to:		
123.01 List and explain several object privileges.		
123.02 Explain the function of the EXECUTE object privilege.		
123.03 Write SQL statements to grant and revoke object privileges.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
124.0 Use invoker's rights. – The student will be able to:		
124.01 Contrast invoker's rights with definer's rights.		
124.02 Create a procedure that uses invoker's rights.		
125.0 Create packages. – The student will be able to:		
125.01 Describe a package, its components, and the reasons for use.		
125.02 Create packages containing related variables, cursors, constants, exceptions, procedures, and functions.		
125.03 Create a program block that invokes a package construct.		
126.0 Manage package constructs. – The student will be able to:		
126.01 Explain the difference between public and private package constructs.		
126.02 Designate a package construct as either public or private.		
126.03 Specify the syntax to drop a package.		
126.04 Identify Data Dictionary views used to manage packages.		
126.05 Identify the guidelines for using packages.		
127.0 Use advanced package concepts. – The student will be able to:		
127.01 Write packages that use the overloading feature.		
127.02 Write packages that use forward declarations.		
127.03 Explain the purpose of a package initialization block.		
127.04 Identify restrictions on using packaged functions in SQL statements.		
128.0 Manage persistent state of package variables. – The student will be able to:		
128.01 Identify persistent states of package variables.		
128.02 Control the persistent state of a package cursor.		
129.0 Use vendor-supplied packages. – The student will be able to:		
129.01 Describe two common uses for vendor-supplied packages.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
129.02 Use the syntax to specify messages for a vendor-supplied package.		
129.03 Identify the exceptions used in conjunction with vendor-supplied packages.		
130.0 Understand dynamic SQL. – The student will be able to:		
130.01 Identify the stages through which all SQL statements pass.		
130.02 Describe the reasons for using dynamic SQL to create an SQL statement.		
130.03 List statements supporting Native Dynamic SQL.		
131.0 Understand triggers. – The student will be able to:		
131.01 Describe database triggers and their uses.		
131.02 Differentiate between a database trigger and an application trigger.		
131.03 List the guidelines for using triggers.		
131.04 Compare and contrast database triggers and stored procedures.		
132.0 Create DML triggers. – The student will be able to:		
132.01 Create a DML trigger and identify its components.		
132.02 Create a statement level trigger.		
132.03 Describe the trigger firing sequence options.		
132.04 Create a DML trigger that uses conditional predicates.		
132.05 Create a row level trigger.		
132.06 Create a row level trigger that uses OLD and NEW qualifiers.		
132.07 Create an INSTEAD OF trigger.		
133.0 Create DDL and database event triggers. – The student will be able to:		
133.01 Describe the events that cause DDL and database event triggers to fire.		
133.02 Create a trigger for a DDL statement.		
133.03 Create a trigger for a database event.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
133.04 Describe the functionality of the CALL statement.		
133.05 Describe the cause of a mutating table.		
134.0 Manage triggers. – The student will be able to:		
134.01 View trigger information in the Data Dictionary.		
134.02 Disable and enable a database trigger.		
134.03 Remove a trigger from the database.		
135.0 Use large object data types. – The student will be able to:		
135.01 Compare and contrast LONG and LOB data types.		
135.02 Describe LOB data types and how they are used.		
135.03 Differentiate between internal and external LOBs.		
135.04 Create and maintain LOB data types.		
135.05 Migrate data from LONG to LOB.		
136.0 Manage binary types. – The student will be able to:		
136.01 Define binary column data type.		
136.02 Create directory objects and view them in the Data Dictionary.		
136.03 Manage and manipulate binary types.		
137.0 Manage indexes. – The student will be able to:		
137.01 Create and manipulate user-defined records.		
137.02 Create an index.		
137.03 Describe the difference between records, tables, and indexes.		
138.0 Manage dependencies. – The student will be able to:		
138.01 Describe the implications of procedural dependencies.		
138.02 Contrast dependent objects and referenced objects.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
138.03 View dependency information in the Data Dictionary.		
138.04 Use a script to create the objects required to display dependencies.		
138.05 Use views to display dependencies.		
138.06 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
139.0 Program a database application. – The student will be able to:		
139.01 Utilize loop statements.		
139.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.		
139.03 Create user-defined functions.		
139.04 Utilize common built-in functions.		
139.05 Declare variables in modules and procedures.		
139.06 Declare arrays, and initialize elements of arrays.		
139.07 Declare and use object variables and collections, and use their associated properties and methods.		
139.08 Declare symbolic constants, and make them available locally or publicly.		
139.09 Respond to events.		
140.0 Utilize the basic concepts of database design. – The student will be able to:		
140.01 Apply basic concepts of normalization.		
140.02 Utilize the cascade update and cascade delete options.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
141.0 Utilize SQL and union queries. – The student will be able to:		
141.01 Utilize SQL to write common queries.		
141.02 Refer to objects by using SQL.		
141.03 Utilize union queries.		
142.0 Implement program statements using objects. – The student will be able to:		
142.01 Determine when to use data access objects.		
142.02 Differentiate between objects and collections.		
142.03 Write statements that access and modify database objects.		
142.04 Utilize data access objects.		
142.05 Select appropriate methods and property settings for use with specified objects.		
143.0 Utilize debugging tools and write error handlers. – The student will be able to:		
143.01 Trap errors.		
143.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.		
143.03 Debug code samples.		
143.04 Utilize the Debugger to monitor variable values.		
143.05 Write an error handler.		
144.0 Demonstrate file I/O. – The student will be able to:		
144.01 Read from files.		
144.02 Write to files.		
144.03 Utilize record locking.		
145.0 Create forms and identify all the properties of a form. – The student will be able to:		
145.01 Choose form-specific and report-specific properties to set.		
145.02 Choose control properties to set.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
145.03 Assign event-handling procedures to controls in a form.		
145.04 Define and create form and report modules.		
145.05 Identify the scope of a form or report module.		
145.06 Open multiple instances of a form, and refer to them.		
145.07 Assign values to form properties.		
145.08 Use form methods.		
146.0 Manipulate data using object models. – The student will be able to:		
146.01 Connect to a data source.		
146.02 Open a recordset.		
146.03 Insert, update, delete and find data.		
147.0 Develop custom controls. – The student will be able to:		
147.01 Set properties for custom controls.		
147.02 Customize user interface controls.		
148.0 Utilize API functions. – The student will be able to:		
148.01 Properly declare functions.		
148.02 Use the by value and by reference parameters.		
149.0 Demonstrate database replication and implement database replication using programming tools. – The student will be able to:		
149.01 Make a database replicable.		
149.02 View a synchronization schedule.		
149.03 Explain how synchronization conflicts are resolved.		
149.04 Identify the advantages of using replication of synchronization.		
149.05 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
150.0 Analyze and implement security options. – The student will be able to:		
150.01 Analyze a scenario, and recommend an appropriate type of security.		
150.02 Explain the steps for implementing security.		
150.03 Analyze code to ensure that it sets security options.		
150.04 Write code to implement security options.		
151.0 Implement client/server applications. – The student will be able to:		
151.01 Demonstrate SQL pass through queries and application queries.		
151.02 Access external data.		
151.03 Trap errors that are generated by the server.		
151.04 Optimize connections.		
151.05 Optimize performance for a given client/server application.		
152.0 Optimize the performance of a database. – The student will be able to:		
152.01 Differentiate between single-field and multiple-field indexes.		
152.02 Optimize queries.		
152.03 Restructure queries to allow faster execution.		
152.04 Optimize performance in distributed applications.		
152.05 Optimize performance for client/server applications.		
153.0 Perform application distribution. – The student will be able to:		
153.01 Prepare an application for distribution.		
153.02 Analyze various methods to distribute a client/server application.		
153.03 Distribute custom controls with an application.		
153.04 Provide online help.		
154.0 Test and debug databases. – The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
154.01 Implement error handling.		
154.02 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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. Secondary or postsecondary students who have previously completed the Software Development Core will not have to repeat the core. 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	Introduction to Information Technology	1 credit	15-1151	2	VO
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	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%
9007210	3/87 3%	8/80 10%	3/83 4%	5/69 7%	5/67 7%	4/69 6%	4/82 5%	8/66 12%	7/74 9%	5/72 7%	5/70 7%
9007220	22/87 25%	22/80 28%	2/83 2%	21/69 30%	2/67 3%	22/69 32%	2/82 2%	17/66 26%	2/74 3%	21/72 29%	20/70 29%
9007230	21/87 24%	21/80 26%	1/83 1%	20/69 29%	1/67 1%	21/69 30%	1/82 1%	16/66 27%	1/74 1%	20/72 28%	20/70 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%	4/54 7%	40/46 82%	40/45 83%	40/45 89%	40/45 0%
9007210	20/67 30%	14/75 19%	17/54 31%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007220	11/67 16%	19/75 25%	9/54 17%	9/46 17%	0/45 0%	0/45 0%	0/45 0%
9007230	0/67 0%	0/75 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.

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 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 Demonstrate comprehension and communication skills.
06.0 Use technology to enhance the effectiveness of communication skills.
07.0 Develop an awareness of management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Practice quality performance in the learning environment and the workplace.
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 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
11.0 Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals.
12.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
13.0 Demonstrate human relations/interpersonal skills appropriate for the workplace.
14.0 Participate in work-based learning experiences.
15.0 Perform e-mail activities.
16.0 Demonstrate knowledge of different operating systems.
17.0 Demonstrate proficiency navigating the internet, intranet, and the WWW.
18.0 Demonstrate proficiency using HTML commands.
19.0 Demonstrate proficiency in page design applicable to the WWW.
20.0 Demonstrate proficiency using specialized web design software.
21.0 Develop an awareness of the information technology industry.
22.0 Develop an awareness of microprocessors and digital computers.
23.0 Develop an awareness of programming languages.
24.0 Develop an awareness of emerging technologies.
25.0 Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model.
26.0 Demonstrate proficiency using common software applications.
27.0 Demonstrate proficiency using specialized software applications.
28.0 Demonstrate language arts knowledge and skills.
29.0 Demonstrate mathematics knowledge and skills.
30.0 Demonstrate science knowledge and skills.
01.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.

02.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
03.0 Distinguish between iterative and non-iterative program control structures.
04.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
05.0 Describe the processes, methods, and conventions for software development and maintenance.
06.0 Explain the types, uses, and limitations of testing for ensuring quality control.
07.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
08.0 Describe information security risks, threats, and strategies associated with software development.
09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
10.0 Solve problems using critical thinking skills, creativity and innovation.
11.0 Use information technology tools.
12.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in .NET Application Development & Programming.
13.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in .NET Application Development & Programming.
14.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in .NET Application Development & Programming.
15.0 Design a computer program to meet specific physical, operational, and interaction criteria.
16.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
17.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
18.0 Create a unit test plan, implement the plan, and report the results of testing.
19.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
20.0 Describe the importance of professional ethics and legal responsibilities.
21.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
22.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
23.0 Design, document, and create object-oriented computer programs.
24.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
25.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
26.0 Understand .NET primitive data types and their uses.
27.0 Describe the types and characteristics of lexical units in the .NET programming language.
28.0 Construct statements that use various .NET operators.
29.0 Construct and use .NET selection control structures.
30.0 Construct and use .NET iterative control structures.
31.0 Construct and use .NET structures for error handling.
32.0 Write .NET programs that define and use user-defined data types, including classes.
33.0 Write .NET programs that define and use methods.
34.0 Write programs that perform console input and output in a .NET program.
35.0 Use namespaces in a .NET program.
36.0 Use arrays in .NET programs.
37.0 Write .NET programs that use the object-oriented concept of inheritance.
38.0 Write .NET programs that use the object-oriented concept of polymorphism.
39.0 Write .NET programs that use the object-oriented concept of encapsulation.

40.0 Apply common programming style guidelines and conventions.
41.0 Use application life cycle management to develop and maintain .NET programs.
42.0 Use nullable values in a .NET program.
43.0 Use the .NET String and StringBuilder classes in an application.
44.0 Use .NET classes to perform stream input/output.
45.0 Use recursive functions to solve problems in .NET programs.
46.0 Write .NET programs that use interfaces.
47.0 Use .NET collections in applications.
48.0 Demonstrate knowledge of different types of .NET applications.
49.0 Demonstrate knowledge of .NET architecture and tools.
50.0 Demonstrate knowledge of Web applications.
51.0 Develop Web pages using HTML, CSS, JavaScript, and ASP.NET.
52.0 Develop .NET Windows Form applications.
53.0 Develop Windows Service applications and class libraries.
54.0 Demonstrate knowledge of database applications.
55.0 Demonstrate knowledge of structured query language (SQL) statements.
56.0 Develop .NET database applications.
57.0 Successfully work as a member of a software development team.
58.0 Manage time according to a plan.
59.0 Keep acceptable records of progress problems and solutions.
60.0 Plan, organize, and carry out a project plan.
61.0 Manage resources.
62.0 Use tools, materials, and processes in an appropriate and safe manner.
63.0 Demonstrate an understanding of the software development process.
64.0 Research content related to the project and document the results following industry conventions.
65.0 Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience.
66.0 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: **Introduction to Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide an introduction to information technology concepts and careers as well as the impact information technology has on the world, people, and industry and basic web design concepts. The content includes information technology career research; operating systems and software applications; electronic communications including e-mail and Internet services; basic HTML, DHTML, and XML web commands and design; and emerging technologies and web page design. After successful completion of Introduction to Information Technology, students will have met Occupational Completion Point A, Information Technology Assistant, SOC Code 15-1151.

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 the program in which the BTE Core is associated.		
	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 the program in which the BTE Core is associated.		
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 the program in which the BTE Core is associated.		
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
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance – the student will be able to:		SC.912.L.14.12, 16, 16.10, 17.11, 13, 15, 16, 19, 20; SC.912.N.1.1, 3, 4, 7, 2.2, 5, 3.5, 4.2
04.01 Develop keyboarding skills to enter and manipulate text and data.	LAFS.910.SL.2.5, LAFS.1112.SL.2.5, LAFS.910.W.2.6, LAFS.1112.W.2.6, LAFS.910.SL.1.2, LAFS.1112.SL.1.2, LAFS.910.L.1.2, LAFS.1112.L.1.2	
04.02 Describe and use current and emerging computer technology and software to perform personal and business related tasks.	LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.910.SL.2.4, LAFS.910.SL.2.5, LAFS.910.SL.2.6, LAFS.910.W.1.2, LAFS.910.W.2.6, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112.SL.1.3, LAFS.1112.SL.2.4, LAFS.1112.SL.2.5, LAFS.1112.SL.2.6, LAFS.1112.W.1.2, LAFS.1112.W.2.6	
04.03 Identify and describe communications and networking systems used in workplace environments.	LAFS.910.RI.2.4, LAFS.1112.RI.2.4, LAFS.910.SL.1.2, LAFS.1112.SL.1.2, LAFS.910.W. 2.4, LAFS.910.W. 2.5, LAFS.910.W. 2.6, LAFS.1112.W. 2.4, LAFS.1112.W. 2.5, LAFS.1112.W. 2.6, LAFS.910.W.3.8, LAFS.1112.W.3.8	
04.04 Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.	LAFS.910.RI.1.1, LAFS.910.RI.1.2, LAFS.910.RI.1.3, LAFS.910.RI.2.4, LAFS.910.RI.2.5, LAFS.910.RI.2.6,	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.RI.3.7, LAFS.1112.RI.1.1, LAFS.1112.RI.1.2, LAFS.1112.RI.1.3, LAFS.1112.RI.2.4, LAFS.1112.RI.2.5, LAFS.1112.RI.2.6, LAFS.1112.RI.3.7, LAFS.910.RI.4.10, LAFS.1112.RI.4.10	
04.05	Troubleshoot problems with computer hardware peripherals and other office equipment.	LAFS.910.SL1.1, LAFS.1112.SL.1.1, LAFS.910.SL.2.5, LAFS.1112.SL.2.5	
04.06	Describe ethical issues and problems associated with computers and information systems.	LAFS.910.RI.4.10, LAFS.1112.RI.4.10, LAFS.910.RI.1.1, LAFS.910.RI.1.2, LAFS.910.RI.1.3, LAFS.1112.RI.1.1, LAFS.1112.RI.1.2, LAFS.1112.RI.1.3, LAFS.910.RI.3.8, LAFS.1112.RI.3.8, LAFS.910.W.3.8, LAFS.1112.W.3.8, LAFS.910.W.1.1, LAFS.1112.W.1.1, LAFS.910.W.1.2, LAFS.1112.W.1.2, LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.910.SL.2.4, LAFS.910.SL.2.5, LAFS.910.SL.2.6, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112.SL.1.3, LAFS.1112.SL.2.4, LAFS.1112.SL.2.5, LAFS.1112.SL.2.6	
05.0	Demonstrate comprehension and communication skills – the student will be able to:		
05.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
05.02	Organize ideas and communicate oral and written messages appropriate for information technology environments.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
05.03	Collaborate with individuals and teams to complete tasks and solve information technology problems.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
05.04	Identify, define, and discuss professional information technology terminology appropriate for internal and external communications in an information technology environment.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L 2.3, 3.4, 3.5, 3.6	
05.05	Apply the writing process to the creation of appropriate documents following designated business formats.	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L.1.1, 1.2 LAFS.1112.L1.1, 1.2	
05.06	Demonstrate an awareness of project management concepts and tools (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration).	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
06.0	Use technology to enhance the effectiveness of communication skills – the student will be able to:		SC.912.N.1.1, 4, 2.2, 3.5
06.01	Use database, spreadsheet, presentation software, scheduling, and integrated software packages to enhance communication.	LAFS.910.RI.4.1 LAFS.910.W.4.1 LAFS.1112.RI.4.1 LAFS.1112.W.4.1 MAFS 912.A-CED.1.1	
06.02	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.	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L.1.1, 1.2 LAFS.1112.L1.1, 1.2	
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles – the student will be able to:		
07.01	Explore, design, implement, and evaluate organizational structures and cultures.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
	07.02 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.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
	07.03 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.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
08.0	Practice quality performance in the learning environment and the workplace – the student will be able to:		
	08.01 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).	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
	08.02 Develop criteria for assessing products and processes that incorporate effective business practices (e.g., time management, productivity, total quality management).	LAFS.910.SL.1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL1.2, 1.3, 2.4, 2.5, 2.6	
09.0	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:		
	09.01 Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
10.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance – the student will be able to:		
	10.01 Analyze, interpret, compile, and demonstrate the ability to present/communicate data in understandable and measurable	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	terms using common statistical procedures.	LAFS.910.W. 4.1 LAFS.1112.W. 4.1 MAFS 912.S-ID.1.1 MAFS.9.12.A-APR.4.6 MAFS.912.A-CED.1.3 MAFS.912.S-MD.2.5 B	
10.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	SC.912.N.1.5
10.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas when appropriate.	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1 MAFS.912.A-CED.1.1, 1.3, 1.4 MAFS 912.A-REI.2.3	
11.0	Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals – the student will be able to:		
11.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1	
11.02	Analyze job and career requirements and relate career interests to opportunities in the global economy.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:		
12.01	Research, compare, and contrast information technology career clusters (e.g., characteristics needed, skills required, education required, industry certifications, advantages and disadvantages of information technology careers, the need for information technology workers).	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
12.02	Describe the variety of occupations and professions within the world of information technology including those where information	LAFS.910.SL.1.2 LAFS.1112.SL.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	technology is either in a primary focus or in a supportive role.	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.03	Describe job requirements for the variety of occupations and professions within the global world of information technology.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.04	Analyze personal skills and aptitudes in comparison with information technology career opportunities.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.05	Refine and implement a plan to facilitate personal growth and skill development related to information technology career opportunities.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.06	Develop and maintain an electronic career portfolio, to include, but not limited to the Resume and Letter of Application.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
13.0	Demonstrate human relations/interpersonal skills appropriate for the workplace – the student will be able to:		
13.01	Accept constructive criticism.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
13.02	Demonstrate personal and interpersonal skills appropriate for the workplace (e.g., responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, professional dress).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
14.0	Participate in work-based learning experiences – the student will be able to:		
14.01	Participate in work-based learning experiences in an information technology environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
14.02	Discuss the use of technology in an information technology environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
15.0	Perform e-mail activities – the student will be able to:		SC.912.N.1.1, 4, 3.5, 4.1, 2
15.01	Describe e-mail capabilities and functions.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.02	Identify components of an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.03	Identify the components of an e-mail address.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.04	Identify when to use different e-mail options.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.05	Attach a file to an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.06	Forward an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.07	Use an address book.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.08	Reply to an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.09	Use the Internet to perform e-mail activities.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.10	Identify the appropriate use of e-mail and demonstrate related e-mail etiquette.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.11	Identify when to include information from an original e-mail message in a response.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
15.12	Identify common problems associated with widespread use of e-mail.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.0	Demonstrate knowledge of different operating systems – the student will be able to:		
16.01	Identify operating system file naming conventions.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.03	Demonstrate a working knowledge of standard file formats.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
17.0	Demonstrate proficiency navigating the internet, intranet, and the WWW – the student will be able to:		
17.01	Identify and describe Web terminology.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5,	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.02	Demonstrate proficiency in using the basic features of GUI browsers (e.g., setting bookmarks, basic configurations, e-mail configurations, address book).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.03	Define Universal Resource Locators (URLs) and associated protocols (e.g., .com, .org, .edu, .gov, .net, .mil).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.04	Describe and observe Internet/Intranet ethics and copyright laws and regulatory control.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.05	Trace the evolution of the Internet from its inception to the present and into the future.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
17.06	Demonstrate proficiency using search engines (e.g., Yahoo!, Google).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.07	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.08	Identify effective Boolean search strategies.	LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
18.0	Demonstrate proficiency using HTML commands – the student will be able to:		
18.01	Identify elements of a Web page.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7, 3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7, 3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.03 Define basic HTML terminology.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7, 3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.04 Analyze HTML source code developed by others.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7, 3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.07 Edit and test HTML documents for accuracy and validity.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.08 Use basic functions of WYSIWYG editors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.09 Use basic functions of HTML, DHTML, and XML editors and converters.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.10 Enhance web pages through the addition of images and graphics including animation.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.0 Demonstrate proficiency in page design applicable to the WWW – the student will be able to:		
19.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.02 Describe and apply color theory as it applies to Web page design (e.g., background and text color).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.04 Use image design software to create and edit images.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.05 Demonstrate proficiency in publishing to the Internet.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.06 Demonstrate proficiency in adding downloadable forms to web pages.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L 2.3, 3.4, 3.5, 3.6	
19.07 Explain the need for web-based applications.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
20.0 Demonstrate proficiency using specialized web design software – the student will be able to:		
20.01 Compare and contrast various specialized web design software (e.g., Flash, Shockwave, GoLive, Director).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
20.02 Demonstrate proficiency using use of various specialized web design software (e.g., Flash, Shockwave, GoLive, Director).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
21.0 Develop an awareness of the information technology industry – the student will be able to:		
21.01 Explain how information technology impacts the operation and management of business and society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
21.02 Explain the emergence of e-commerce and e-government and the potential impact on business and society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
21.03 Explain the emergence of a paperless society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.0 Develop an awareness of microprocessors and digital computers – the student will be able to:		
22.01 Describe the evolution of the digital computer.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
22.02 Explain the general architecture of a microcomputer system.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.03 Explain the evolution of microprocessors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.04 Explain software hierarchy and its impact on microprocessors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.05 Explain the need for and use of peripherals.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.06 Demonstrate proficiency using peripherals.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.07 Identify the basic concepts of computer maintenance and upgrades.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.08 Differentiate between diagnosing and troubleshooting.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.0 Develop an awareness of programming languages – the student will be able to:		
23.01 Explain the history of programming languages.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.02 Explain the need for and use of compilers.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.03 Explain how compilers work.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.04 Identify the three types of programming design approaches (e.g., top-down, structured, and object-oriented).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
24.0	Develop an awareness of emerging technologies – the student will be able to:		
	24.01 Compare and contrast various methods of evaluation for emerging technologies.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	24.02 Demonstrate knowledge of the process of planning upgrades and changeovers.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	24.03 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.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.0	Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model – the student will be able to:		
	25.01 Identify how types of networks and how they work.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	25.02 Identify the role of servers and clients on a network.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	25.03 Identify benefits and risks of networked computing.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	25.04 Identify the relationship between computer networks and other communications networks (i.e. telephone systems).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	25.05 Identify Intranets, Extranets and how they relate to the Internet.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	25.06 Demonstrate basic understanding of network administration.	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.910.W.4.1 LAFS.1112.W4.1 LAFS.910.L.2.3, 3.4, 3.6 LAFS.1112.L.2.3, 3.4, 3.6	
	25.07 Describe the evolution of OSI from its inception to the present and into the future.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	25.08 Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.4.1 LAFS.1112.W4.1 LAFS.910.L.2.3, 3.4, 3.6 LAFS.1112.L.2.3, 3.4, 3.6	
26.0	Demonstrate proficiency using common software applications – the student will be able to:		
	26.01 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.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	SC.912.N.1.1, 3, 4, 6, 7, 3.5, 4.2; SC.912.P.10.18
	26.02 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).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	SC.912.N.1.1, 3, 4, 1.7, 3.5
27.0	Demonstrate proficiency using specialized software applications – the student will be able to:		
	27.01 Compare and contrast the appropriate use of specialized software applications (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation process control, materials management).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	27.02 Demonstrate awareness of specialized software applications (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation, process control, materials management)	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
	27.03 Demonstrate the ability to incorporate digital sound.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

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 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 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 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 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
31.0	Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:		
31.01	Describe the evolution of programming and programming careers.	MAFS.912.A-REI.1.1	
31.02	Identify tasks performed by programmers.	MAFS.912.N-Q.1.1	
31.03	Describe how businesses use computer programming to solve business problems.	MAFS.912.A-REI.1.1	
31.04	Investigate job opportunities in the programming field.		
31.05	Explain different specializations and the related training in the computer programming field.	MAFS.912.A-REI.1.1 MAFS.912.G-SRT.1.2	
31.06	Explain the need for continuing education and training of computer programmers.	MAFS.912.A-REI.1.1	
31.07	Explain enterprise software systems and how they impact business.	MAFS.912.A-REI.1.1	
31.08	Describe ethical responsibilities of computer programmers.	MAFS.912.A-REI.1.1	
31.09	Describe the role of customer support to software program quality.	MAFS.912.A-REI.1.1	
31.10	Identify credentials and certifications that may improve employability for a computer programmer.	MAFS.912.N-Q.1.1	
31.11	Identify devices, tools, and other environments for which programmers may develop software.	MAFS.912.G-CO.4.12; MAFS.912.N-Q.1.1	
32.0	Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:		
32.01	Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.	MAFS.912.N-Q.1.2	
32.02	Explain the types and uses of variables in programs.	MAFS.912.A-REI.1.1; MAFS.912.A-SSE.1.1	
32.03	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
32.04	Identify the types of operations that can be performed on different data types.	MAFS.912.N-Q.1.1	
32.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
32.06	Explain how computers store different data types in memory.	MAFS.912.A-REI.1.1	
32.07	Use different number systems to represent data.	MAFS.912.N-Q.1.1	
32.08	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.	MAFS.912.A-REI.1.1	
32.09	Use Boolean logic to perform logical operations.		
33.0	Distinguish between iterative and non-iterative program control structures. – The student will be able to:		
33.01	Explain non-iterative programming structures (e.g., if, if/else) and their uses.	MAFS.912.A-REI.1.1	
33.02	Explain iterative programming structures (e.g., while, do/while) and their uses.	MAFS.912.A-REI.1.1	
34.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:		
34.01	Identify the characteristics, uses, and limits of low-level programming languages.	MAFS.912.N-Q.1.1	
34.02	Identify the characteristics, uses, and limits of high-level programming languages.	MAFS.912.N-Q.1.1	
34.03	Identify the characteristics, uses, and limits of rapid development programming languages.	MAFS.912.N-Q.1.1	
34.04	Describe object-oriented concepts.	MAFS.912.A-REI.1.1	
34.05	Explain the characteristics of procedural and object-oriented programming languages.	MAFS.912.A-REI.1.1	
34.06	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	
35.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:		
35.01	Describe and explain tools used in software development.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	
35.02	Describe the stages of the program life cycle.	MAFS.912.A-REI.1.1	
35.03	Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).	MAFS.912.G-SRT.1.2	
35.04	List and explain the steps in the program development cycle.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
35.05	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	
35.06	Describe the on-going need for program maintenance.	MAFS.912.A-REI.1.1	
35.07	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	
35.08	Describe different methods used to facilitate version control and change management.	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
36.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:		
36.01	Explain the uses and limits of testing in ensuring program quality.	MAFS.912.A-REI.1.1	SC.912.N.1.1
36.02	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	
36.03	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
36.04	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	
36.05	Identify the data to be used for boundary conditions.	MAFS.912.N-Q.1.1	
36.06	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
37.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:		
37.01	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
37.02	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
37.03	Explain the role of existing libraries and packages in facilitating programmer productivity.	MAFS.912.A-REI.1.1	
37.04	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
37.05	Write a program design document using UML or other standard design methodology.	MAFS.912.A-CED.1.1	
37.06	Define input and output for a program module using UML or other standard design methodology.	MAFS.912.F-IF.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
38.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:		
38.01	Explain the security risks to personal and business computer users.	MAFS.912.S-IC.2.6	
38.02	Identify different types of threats to computer systems.	MAFS.912.N-Q.1.1	
38.03	Identify methods to protect against different threats to computer systems.	MAFS.912.N-Q.1.1	
38.04	Understand the importance of a disaster / emergency response plan.		
38.05	Identify alternative methods for data storage and backup (e.g., mirroring, fail-over, high availability, types of backups).	MAFS.912.N-Q.1.1	
39.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
39.01	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
39.02	Locate, organize and reference written information from various sources.		SC.912.N.1.1.6
39.03	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
39.04	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
39.05	Apply active listening skills to obtain and clarify information.		
39.06	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
39.07	Exhibit public relations skills that aid in achieving customer satisfaction.		
40.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
40.01	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
40.02	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
40.03	Identify and document workplace performance goals and monitor progress toward those goals.	MAFS.912.N-Q.1.1	
40.04	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
41.0	Use information technology tools. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
41.01	Use personal information management (PIM) applications to increase workplace efficiency.		
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.G-CO.4.12	
41.03	Employ computer operations applications to access, create, manage, integrate, and store information.	MAFS.912.Z-CED.1.1	
41.04	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 #
42.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Java Development & Programming.		
	42.01 Key Ideas and Details		
	42.01.1	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	
	42.01.2	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	
	42.01.3	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	
	42.02 Craft and Structure		
	42.02.1	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	
	42.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	42.02.3	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 #
42.03	Integration of Knowledge and Ideas		
	42.03.1	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	
	42.03.2	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	
	42.03.3	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	
42.04	Range of Reading and Level of Text Complexity		
	42.04.1	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.	
	42.04.2	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	
43.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Java Development & Programming.		
43.01	Text Types and Purposes		
	43.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	43.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
43.02	Production and Distribution of Writing		
	43.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	43.02.2	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	
	43.02.3	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	
	43.03	Research to Build and Present Knowledge	
	43.03.1	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	
	43.03.2	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	
	43.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	43.04	Range of Writing	
	43.04.1	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	
44.0		Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.	
	44.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	44.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	44.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	44.04	Model with mathematics. MAFS.K12.MP.4.1	
	44.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	44.06	Attend to precision. MAFS.K12.MP.6.1	
	44.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
44.08 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
45.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:		
45.01	Choose appropriate data types depending on the needs of the program.	MAFS.912.N-Q.1.1	
45.02	Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).	MAFS.912.N-Q.1.2	
45.03	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	
45.04	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	
45.05	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	
46.0	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:		
46.01	Use appropriate naming conventions to define program variables and modules (methods, functions).	MAFS.912.N-Q.1.1	
46.02	Use a program editor to write the source code for a program.	MAFS.912.A-REI.1.1	
46.03	Write programs that use selection structures (e.g., if, if/else).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.04	Write programs that use repetition structures (e.g., while, do/while).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.05	Write programs that use nested structures.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.06	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.		
46.07	Compile and run programs.	MAFS.912.A-REI.1.1	
46.08	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	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
	46.09 Write programs that use standard logic operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	46.10 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	
	46.11 Write programs that perform data conversion between standard data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	46.12 Write programs that define, use, search, and sort arrays.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	46.13 Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	46.14 Demonstrate understanding and use of appropriate variable scope.	MAFS.912.A-REI.1.1	
47.0	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:		
	47.01 Write programs that perform user input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.02 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	
	47.03 Write program modules such as functions, subroutines, or methods.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.04 Write program modules that accept arguments.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.05 Write program modules that return values.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.06 Write program modules that validate arguments and return error codes.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.07 Write interactive programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.08 Write programs that use standard libraries to enhance program function.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.		
48.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:		
	48.01 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
	48.02 Test and debug programs, including programs written by others.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	48.03 Write a test report that identifies the results of testing.	MAFS.912.A-REI.1.1	SC.912.N.1.1
	48.04 Trace through the function of a program to ensure valid operation.	MAFS.912.N-Q.1.1	
	48.05 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	
	48.06 Create a disaster/emergency response plan for a computer system.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
49.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
	49.01 Employ leadership skills to accomplish organizational goals and objectives.		
	49.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
	49.03 Conduct and participate in meetings to accomplish work tasks.		
50.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
	50.01 Evaluate and justify decisions based on ethical reasoning.	MAFS.912.S-IC.2.6	
	50.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	MAFS.912.S-IC.2.6	
	50.03 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 #
42.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Java Development & Programming.		
42.01	Key Ideas and Details		
	42.01.1	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	
	42.01.2	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	
	42.01.3	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	
42.02	Craft and Structure		
	42.02.1	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	
	42.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	42.02.3	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	
42.03	Integration of Knowledge and Ideas		
	42.03.1	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	
	42.03.2	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	
	42.03.3	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	
42.04	Range of Reading and Level of Text Complexity		
	42.04.1	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.	
	42.04.2	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	
43.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Java Development & Programming.		
43.01	Text Types and Purposes		
	43.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	43.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
43.02	Production and Distribution of Writing		
	43.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	43.02.2	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	
	43.02.3	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	
	43.03	Research to Build and Present Knowledge	
	43.03.1	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	
	43.03.2	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	
	43.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	43.04	Range of Writing	
	43.04.1	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	
44.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Java Development & Programming.		
	44.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	44.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	44.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	44.04	Model with mathematics. MAFS.K12.MP.4.1	
	44.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	44.06	Attend to precision. MAFS.K12.MP.6.1	
	44.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
44.08 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
51.0 Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:		
51.01 Demonstrate the understanding and use of classes, objects, attributes, and behaviors.	MAFS.912.A-REI.1.1	
51.02 Demonstrate the understanding and use of inheritance.	MAFS.912.A-REI.1.1	
51.03 Demonstrate the understanding and use of data encapsulation.	MAFS.912.A-REI.1.1	
51.04 Demonstrate the understanding and use of polymorphism.	MAFS.912.A-REI.1.1	
52.0 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:		
52.01 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	
52.02 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	
52.03 Design an object-oriented program using UML or another standard design methodology.	MAFS.912.H-CED.1.1	
52.04 Work with other team members to develop a project plan for a program.	MAFS.912.A-REI.1.1	
52.05 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	
52.06 Participate in design meetings that review program design documents for conformance to program requirements.	MAFS.912.S.IC.2.6	
52.07 Estimate the time to develop a program or module.	MAFS.912.S.IC.2.6	
53.0 Design, document, and create object-oriented computer programs. – The student will be able to:		
53.01 Compare and contrast recursive functions to other iterative methods.	MAFS.912.G-SRT.1.2	
53.02 Understand the implementation of character strings in the programming language.		
53.03 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).		
53.04 Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.05 Write object-oriented programs that use inheritance.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.06 Write object-oriented programs that use polymorphism.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.07 Develop class constructors.	MAFS.912.S-MD.1.3	
53.08 Write programs that define and use program constants.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.09 Write programs that perform error handling.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.10 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	
53.11 Write programs that perform dynamic memory allocation.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.12 Write programs that perform effective management of dynamically allocated memory.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.13 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	
53.14 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	
53.15 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	
	53.16 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	
	53.17 Perform basic database commands including connect, open, select, and close.	MAFS.912.A-REI.1.1	
54.0	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:		
	54.01 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
	54.02 Write test plans for event-driven programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	SC.912.N.1.1
	54.03 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
	54.04 Perform test and debug activities on object-oriented programs, including those written by someone else.	MAFS.912.A-REI.1.1	
	54.05 Perform test and debug activities on an event-driven program.	MAFS.912.A-REI.1.1	
	54.06 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	
	54.07 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
51.0	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:		
51.01	Cite examples of jobs, salary, and opportunities he/she will have as a .NET programmer.		
51.02	Describe the role a database plays in a business.		
51.03	Explain the value of middleware, such as the .NET framework, in developing software applications.		
51.04	Understand the importance of clear communication when discussing business informational requirements.		
52.0	Understand .NET primitive data types and their uses. – The student will be able to:		
52.01	Describe how variables are used in programs.		
52.02	Identify the .NET built-in value types, their uses, and the ranges of values supported by each type.		
52.03	Identify the default values for built-in value types.		
52.04	Write statements that declare and initialize variables.		
52.05	Write statements that assign literal values to numeric types.		
52.06	Identify the .NET built-in reference types.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
52.07	Write statements that assign string literals to string types.		
52.08	Explain the memory size requirements for the various data storage types.		
52.09	Identify which types are stored on the heap and which are stored on the stack.		
52.10	Identify which data type should be used for a given purpose in a program.		
52.11	Write statements that create variables with values that cannot be changed (i.e., const, final).		
52.12	Identify the syntax for declaring and initializing each of the built-in data types.		
52.13	Differentiate between implicit and explicit data type conversions.		
52.14	Describe when implicit data type conversions take place.		
52.15	Write statements that use explicit type conversion.		
52.16	List the drawbacks of implicit data type conversions.		
52.17	Compare and contrast boxing and unboxing.		
52.18	Describe the scope of a variable.		
52.19	Describe how the compiler uses scope to distinguish between variables with the same name.		
53.0	Describe the types and characteristics of lexical units in the .NET programming language. – The student will be able to:		
53.01	Describe the types of lexical units (e.g., keywords, directives, operators).		
53.02	Describe identifiers and identify valid and invalid identifiers.		
53.03	Describe and identify reserved words, delimiters, literals, and comments.		
54.0	Construct statements that use various .NET operators. – The student will be able to:		
54.01	Construct statements using arithmetic operators.		
54.02	Construct statements using relational operators.		
54.03	Construct and use statements using logical operators.		
54.04	Construct and use statements using assignment operators.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
54.05 Construct and execute statements using operator precedence.		
54.06 Construct and execute statements using methods and fields of the Math class.		
55.0 Construct and use .NET selection control structures. – The student will be able to:		
55.01 Construct and use an if structure in a program.		
55.02 Construct and use an if/else structure in a program.		
55.03 Construct and use multiple-selection structures (e.g., switch, elseif, select) in programs.		
55.04 Construct and use nested selection structures in a program.		
55.05 Construct and use a conditional operator.		
56.0 Construct and use .NET iterative control structures. – The student will be able to:		
56.01 Describe the types of iterative control structures and their uses.		
56.02 Construct and use a while structures (e.g., while, do/while, do/until) in a program.		
56.03 Construct and use a for structure in a program.		
56.04 Construct and use a control structure that iterates over each item in a collection (e.g., foreach, for/each/next).		
56.05 Describe the limits and advantages of different iterative control structure (i.e., while, do/while, for, foreach or for/each).		
56.06 Construct and use nested structures (iterative and selective) in a program.		
56.07 Write programs that alter the execution of program loops (e.g., break, continue, exit).		
57.0 Construct and use .NET structures for error handling. – The student will be able to:		
57.01 Describe the different types of software errors.		
57.02 Compare and contrast alternatives for handling errors.		
57.03 Write programs that validate user input and handle errors.		
57.04 Explain the correct method for using multiple catch blocks for exceptions.		
57.05 Explain the purpose of the finally block in exception handling.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	57.06 Write programs that handle exceptions using the try/catch/finally structure.		
	57.07 Write programs with nested exception handling.		
	57.08 Explain the concept of structured exception handling.		
	57.09 Identify common exceptions and their causes.		
	57.10 Explain the concept of throwing a new exception.		
	57.11 Write programs that catch and re-throw exceptions.		
	57.12 Write exception handlers that use characteristics of the exception argument in the program.		
58.0	Write .NET programs that define and use user-defined data types, including classes. – The student will be able to:		
	58.01 Explain the concept of a user-defined data type.		
	58.02 Distinguish between structures and classes.		
	58.03 Identify the syntax for declaring enumerations and structures.		
	58.04 Write programs that use declare and use enumerations.		
	58.05 Write programs that declare and use structures.		
	58.06 Explain the characteristics of different class constructs including instance variables, properties, fields, methods, events, object references, and constructors.		
	58.07 Write programs that declare and use classes.		
	58.08 Distinguish between different types of classes, including base class, derived class, abstract class, and sealed class.		
	58.09 Explain the impact of using different access modifiers on user-defined data types.		
	58.10 Use access modifiers in a program to control visibility to variables and user-defined data types.		
	58.11 Explain the this reference and its uses.		
59.0	Write .NET programs that define and use methods. – The student will be able to:		
	59.01 Identify the benefits of using methods.		
	59.02 Describe the different types of class methods and their purposes.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	59.03 Create class methods that do and do not return values.		
	59.04 Write statements that invoke a method.		
	59.05 Create a method using arguments.		
	59.06 Invoke a method that has arguments.		
	59.07 Describe a method signature.		
	59.08 Describe the purpose of overloading methods.		
	59.09 Write programs that have overloaded methods.		
	59.10 Define methods that have default arguments.		
	59.11 Describe the conflict between overloaded methods and default arguments.		
	59.12 Explain the impact of using different access modifiers on class methods.		
	59.13 Write methods that use argument modifiers (e.g., out, ref, byref, byval, const).		
60.0	Write programs that perform console input and output in a .NET program. – The student will be able to:		
	60.01 Use the Console class to read and write data from the console.		
	60.02 Write statements that use escape sequences.		
	60.03 Write statements that format string and numeric output.		
	60.04 Write statements that use the ToString method to output data.		
61.0	Use namespaces in a .NET program. – The student will be able to:		
	61.01 Compare and contrast assemblies and namespaces.		
	61.02 Describe the use of namespaces in .NET programming.		
	61.03 Describe commonly used .NET namespaces (e.g., System, System.IO, System.Collections, System.Drawing).		
	61.04 Identify the correct namespace to include for specified classes.		
	61.05 Write programs that define a namespace.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	61.06 Create namespaces that abide by standard naming convention.		
62.0	Use arrays in .NET programs. – The student will be able to:		
	62.01 Write statements to declare and initialize an array.		
	62.02 Demonstrate the use of initializer lists.		
	62.03 Write methods that take an array as an argument.		
	62.04 Write methods that return an array to the calling method.		
	62.05 Write statements to update, and destroy arrays.		
	62.06 Explain linear and binary searching.		
	62.07 Use the static methods of the Array class to perform searches, binary searches, and sorts.		
	62.08 Demonstrate the use of multidimensional arrays.		
	62.09 Demonstrate the use of jagged arrays (array of arrays).		
63.0	Write .NET programs that use the object-oriented concept of inheritance. – The student will be able to:		
	63.01 Explain the purpose and use of inheritance in object oriented programming.		
	63.02 Compare and contrast single and multiple inheritance.		
	63.03 Explain the purpose and implementation of classes that cannot serve as a base class (a sealed class).		
	63.04 Describe has-a and is-a relationships.		
	63.05 Create class hierarchies using inheritance.		
	63.06 Declare and use a class derived from another class (implementing an is-a relationship).		
	63.07 Declare and use a class where the derived class overrides methods of the base class.		
	63.08 Declare and use a class that contains another class as a data member (implementing a has-a relationship).		
	63.09 Write statements that determine at run time whether an instance of a class is derived from a specific base class or interface.		
	63.10 Write statements that invoke a method of the base class from a derived class.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	63.11 Identify which class methods can be inherited and which cannot.		
	63.12 Explain how access modifiers affect the inheritance of class variables and methods.		
64.0	Write .NET programs that use the object-oriented concept of polymorphism. – The student will be able to:		
	64.01 Explain the purpose and implementation of classes that cannot be instantiated (an abstract class).		
	64.02 Explain the purpose and implementation of virtual class methods that must be overridden by derived classes.		
	64.03 Explain the use of abstract classes in enforcing polymorphism.		
	64.04 Create an abstract class.		
	64.05 Create classes that derive from an abstract class.		
	64.06 Create a program that uses polymorphism.		
65.0	Write .NET programs that use the object-oriented concept of encapsulation. – The student will be able to:		
	65.01 Define and use classes that use access modifiers (e.g., private, public, protected, internal, internal protected) to provide encapsulation of data.		
	65.02 Explain the restrictions on using accessibility levels.		
	65.03 Compare and contrast different types of variable scope, including block, procedure, module/class, and project scope.		
	65.04 Compare and contrast different types of method scope, including public, private, protected, friend, and protectedfriend.		
	65.05 Write programs that use local variables.		
	65.06 Describe the scope of a given variable.		
	65.07 Describe how the compiler uses scope to distinguish between variables with the same name.		
	65.08 Explain the purpose and use of static classes, variables and methods.		
	65.09 Write programs that create and use static classes, variables, and methods.		
66.0	Apply common programming style guidelines and conventions. – The student will be able to:		
	66.01 List examples of good programming practices.		
	66.02 Insert comments into code.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
66.03	Follow formatting guidelines when writing code.		
66.04	Define guidelines for declaring and initializing variables.		
67.0	Use application life cycle management to develop and maintain .NET programs. – The student will be able to:		
67.01	Describe the stages in the life cycle of an application.		
67.02	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.		
67.03	Describe how the needs of the customer affect the development of an application.		
67.04	Describe the different types of testing that are performed on an application.		
67.05	Describe the role of tools such as UML (Unified Modeling Language) in ensuring the integrity of the application.		
67.06	Describe different types of UML diagrams and guidelines for their use.		
67.07	Develop a class based on its description in a UML diagram.		
67.08	Read an application specification and translate it into a working program.		
67.09	Describe the characteristics of different types of application development (e.g., Agile development).		
67.10	Compare and contrast different methodologies for application development (e.g., Scrum, XP, Crystal, FDD, DSDM).		
67.11	Describe different methods for deploying applications.		
68.0	Use nullable values in a .NET program. – The student will be able to:		
68.01	Describe the use of nullable value types.		
68.02	Describe the use of the null value in .NET programs.		
68.03	Write statements to declare and initialize nullable value types.		
68.04	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
69.0	Use the .NET String and StringBuilder classes in an application. – The student will be able to:		
69.01	Compare and contrast the String and StringBuilder classes.		
69.02	Identify the performance implications of using the String and StringBuilder classes for different purposes.		
69.03	Use the methods of the String class to compare, search, format, split and join strings.		
69.04	Use the methods of the String and StringBuilder classes to find, replace, delete, and insert substrings.		
69.05	Use the methods of the String class to translate a string into uppercase or lowercase.		
69.06	Use culture information to modify strings.		
70.0	Use .NET classes to perform stream input/output. – The student will be able to:		
70.01	Compare and contrast .NET classes used to perform file input/output (e.g., StreamReader, StreamWriter, StringReader, StringWriter, MemoryStream, BinaryReader, BinaryWriter).		
70.02	Compare and constrast .NET classes used to manipulate files and directories (e.g., Directory, DirectoryInfo, File, FileInfo, Path).		
70.03	Use .NET classes to search, add, and delete directories.		
70.04	Use .NET classes to search, add, and delete files.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
70.05	Use .NET classes to read and write text to a file.		
70.06	Use .NET classes to read and write objects of a variety of types to a file.		
70.07	Use .NET classes to read and write binary data to a file.		
70.08	Compare and contrast .NET classes used to compress data (e.g., GZipStream, DeflateStream).		
70.09	Use .NET classes to read and write compressed data to a file.		
71.0	Use recursive functions to solve problems in .NET programs. – The student will be able to:		
71.01	Describe the use of recursive methods in solving problems.		
71.02	Describe the difference of iterative and recursive methods.		
71.03	Demonstrate the use of direct recursion.		
71.04	Demonstrate the use of indirect recursion.		
72.0	Write .NET programs that use interfaces. – The student will be able to:		
72.01	Describe interfaces and their use in .NET programming.		
72.02	Declare and use a class that implements a standard interface.		
72.03	Compare and contrast inheritance from a base class and inheritance of an interface.		
72.04	Identify common interfaces and their purposes (e.g., IComparable, IComparer, IEquatable, IDisposable, IFormattable, IConvertible).		
72.05	Define and use a custom interface.		
72.06	Write classes that implement common interfaces (e.g., IComparable, IComparer, IEquatable, IDisposable, IFormattable, IConvertible).		
72.07	Describe the program to interface principle and its benefits.		
73.0	Use .NET collections in applications. – The student will be able to:		
73.01	Compare and contrast common non-generic collection classes, including ArrayList, BitArray, HashTable, Queue, and Stack.		
73.02	Write programs that use common non-generic collection classes.		
73.03	Compare and contrast non-generic collection classes to generic collection classes.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
73.04	Compare and contrast common generic collection classes, including Dictionary, LinkedList, Queue, SortedDictionary, SortedList, and Stack.		
73.05	Write programs that use common generic collection classes.		
73.06	Identify the collection class that is the best choice for different application requirements.		
73.07	Use iterators to access individual members of different types of collections.		
73.08	Use standard methods to add, delete, and modify members of different types of collections.		
73.09	Write statements to access members of a dictionary based on a key.		
73.10	Write statements to determine the existence of members of a dictionary based on a key or a value.		
74.0	Demonstrate knowledge of different types of .NET applications. – The student will be able to:		
74.01	Compare and contrast different types of .NET applications (e.g., Console, Windows Form, WPF, Windows Service, Class Library, Web, database).		
74.02	Choose the best type of application to develop for a given application scenario.		
74.03	Describe the characteristics and capabilities of a console application.		
74.04	Develop, test, and debug a console application.		
74.05	Write a console application that uses command-line arguments.		
75.0	Demonstrate knowledge of .NET architecture and tools. – The student will be able to:		
75.01	Describe components of the .NET architecture, including the Common Language Runtime (CLR), just-in-time (JIT) compiler, intermediate language (IL).		
75.02	Describe the steps required for a managed assembly to be built and run in the .NET environment.		
75.03	Compile single-file and multi-file assemblies using command-line tools.		
75.04	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.		
75.05	Use a signing tool to sign an assembly.		
75.06	Use a disassembly tool to view the classes, members, and methods of an assembly.		
75.07	Describe the garbage collection process.		
76.0	Demonstrate knowledge of Web applications. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
76.01	Describe the Web as a platform for applications.		
76.02	Compare and contrast static and dynamic content.		
76.03	Describe how Web pages are loaded to a computer from the Internet including the hardware, software, servers, and protocols required.		
76.04	Compare and contrast server-side and client-side programming.		
76.05	Describe how a Web browser downloads and renders a Web page.		
76.06	Describe options and methodology for Web site deployment.		
76.07	Compare and contrast different Web development technologies, including HTML, CSS, JavaScript, CGI scripts, XML, and ASP.NET.		
76.08	Describe common Web page terminology (e.g., page life cycle, the Web page event model, Web Page state management, cookies, virtual directories).		
76.09	Define the steps in the page life cycle of an ASP.NET Web page.		
76.10	Describe state management as it related to maintenance of page information.		
76.11	Describe how Web services are accessed from a client application.		
76.12	Describe the PostBack mechanism for posting data to a Web page using ASP.NET.		
76.13	Describe the role of Internet Information Services (IIS).		
76.14	Describe the role of Internet Service Providers (ISP) and the services they provide.		
76.15	Describe Web services and related tools (e.g., Extensible Markup Language (XML), Simple Object Access Protocol (SOAP) and Web Service Definition Language (WSDL).		
76.16	Describe the characteristics and purposes of Application objects and Session objects that are maintained by the ASP.NET run-time engine.		
76.17	Describe the common ASP.NET events for applications and sessions (i.e., application start, application end, application error, session start, session end).		
76.18	Describe entities that define standards for Internet applications (e.g., WS3, OASIS, WS-I).		
77.0	Develop Web pages using HTML, CSS, JavaScript, and ASP.NET. – The student will be able to:		
77.01	Describe the characteristics and capabilities of a Web application.		
77.02	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
77.03	Develop Web pages using CSS (cascading style sheets) to define a uniform appearance across multiple Web pages.		
77.04	Develop Web pages using JavaScript to define and implement interactive content.		
77.05	Define and use functions in JavaScript.		
77.06	Define and use local and global variables using JavaScript.		
77.07	Use conditional operators in JavaScript to selectively perform specific function.		
77.08	Use Boolean conditions in JavaScript to selectively perform with multiple conditions.		
77.09	Use JavaScript loops to perform iteration.		
77.10	Use string objects and escape sequences in a JavaScript.		
77.11	Use JavaScript to access, use, and modify HTML elements.		
77.12	Use JavaScript to handle common events, including mouse events, key events, and page events.		
77.13	Use JavaScript to create and manage forms within a Web page.		
77.14	Develop Web pages that use ASP.NET to provide interactivity.		
77.15	Describe standards for making Web pages accessible to individuals with disabilities.		
77.16	Develop Web pages that conform to accessibility standards.		
78.0	Develop .NET Windows Form applications. – The student will be able to:		
78.01	Describe the characteristics and capabilities of a Windows Forms application.		
78.02	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).		
78.03	Develop an interactive Windows Forms application that uses a variety of objects for input and output.		
78.04	Perform data validation on input fields.		
78.05	Describe the Windows Forms event model.		
78.06	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
78.07	Define Windows Forms applications with graphical user interfaces (GUI) that conform to appropriate usability guidelines.		
78.08	Create Windows Forms applications that use Multiple Document Interface (MDI) and Single Document Interface (SDI).		
78.09	Describe visual inheritance.		
78.10	Develop a Windows Forms application that inherits a form from a base application.		
79.0	Develop Windows Service applications and class libraries. – The student will be able to:		
79.01	Describe the characteristics and capabilities of a Windows Service application.		
79.02	Describe the states in the lifetime of a service.		
79.03	Describe the ServiceBase and ServiceController classes and their role in developing and controlling Windows Service applications.		
79.04	Develop a Windows Service application.		
79.05	Develop an installer for a Windows Service application.		
79.06	Install and deploy a Windows Service application.		
79.07	Test and debug a Windows Service application.		
79.08	Uninstall a Windows Service application.		
79.09	Develop, test, and debug a Class Library.		
80.0	Demonstrate knowledge of database applications. – The student will be able to:		
80.01	Explain common database terminology (e.g., relationships, normalization, fields, records, data integrity, referential integrity).		
80.02	Describe the benefits and characteristics of relational databases.		
80.03	Define primary keys and foreign keys and describe their purposes.		
80.04	Explain how database design fits into the database application development process.		
80.05	Translate an entity-relationship model into a relational database design.		
80.06	Differentiate between one-to-one, one-to-many, and many-to-many relationships.		
80.07	Move data from an unnormalized form through to a third normal form.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
80.08	Based on information requirements, define database tables that ensure data integrity and reduce redundant data.		
80.09	Describe routine maintenance for databases.		
81.0	Demonstrate knowledge of structured query language (SQL) statements. – The student will be able to:		
81.01	Describe the data manipulation language (DML) and describe various DML statements.		
81.02	List the capabilities of SQL SELECT statements.		
81.03	Write and execute a basic SELECT statement.		
81.04	Write and execute SELECT statements using the WHERE clause with common operators (i.e., =, <>, >, <, >=, <=, BETWEEN, LIKE, IN).		
81.05	Write and execute SELECT statements using the WHERE clause with logical operators, including AND and OR.		
81.06	Write and execute SELECT statements using the ORDER BY clause.		
81.07	Write and execute SELECT statements using wildcards.		
81.08	Write and execute UPDATE statements to modify rows in a table.		
81.09	Write and execute INSERT statements to insert rows into a table.		
81.10	Write and execute DELETE statements to delete rows in a table.		
81.11	Write and execute statements using JOIN to select data from two or more related tables.		
81.12	Write and execute statements that use SQL to perform common calculations (e.g., AVG, MAX, MIN, SUM).		
82.0	Develop .NET database applications. – The student will be able to:		
82.01	Describe the purpose of ActiveX Data Objects (ADO).		
82.02	Describe the purpose of the ADO connection object.		
82.03	Write statements to connect to a database.		
82.04	Write statements to open a database.		
82.05	Write statements to create a recordset.		
82.06	Write statements to commit a transaction to a database.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
82.07 Write statements to rollback a transaction to a database.		
82.08 Write statements to close a connection to a database.		
82.09 Develop, test, and debug a database application.		
82.10 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
83.0	Successfully work as a member of a software development team. – The student will be able to:		
83.01	Accept responsibility for specific tasks in a given situation.		
83.02	Document progress, and provide feedback on work accomplished in a timely manner.		
83.03	Complete assigned tasks in a timely and professional manner.		
83.04	Reassign responsibilities when the need arises.		
83.05	Complete daily tasks as assigned on one's own initiative.		
84.0	Manage time according to a plan. – The student will be able to:		
84.01	Set realistic time frames and schedules.		
84.02	Keep a written record of work accomplished on a daily basis.		
84.03	Meet goals and objectives set by the team.		
84.04	Identify individual priorities.		
84.05	Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities, as needed.		
85.0	Keep acceptable records of progress problems and solutions. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
85.01	Develop and use a record keeping system to record daily progress.		
85.02	Use a project journal to identify problem statement.		
85.03	Develop a portfolio of work accomplished to include requirements documents, design documents and UML, project and test plans, and prototypes.		
86.0	Plan, organize, and carry out a project plan. – The student will be able to:		
86.01	Identify a substantive problem that can be addressed with a .NET software solution.		
86.02	Identify and document the potential customers for the project.		
86.03	Identify and document the customer requirements for the project including use case definitions.		
86.04	Document the proposed user interface for the project using common tools (e.g., mockups, event planning documents).		
86.05	Identify the hardware and software requirements for the project.		
86.06	Identify the programming tools required to develop the project.		
86.07	Write a detailed design document for the project.		
86.08	Write a detailed test plan for the project that addresses varying levels of testing including system testing and usability testing.		
86.09	Determine the scope of a project.		
86.10	Organize the team according to individual strengths.		
86.11	Assign specific tasks within a team.		
86.12	Determine project priorities.		
86.13	Identify required resources to complete the project.		
86.14	Plan, research, design, develop, and evaluate activities, as required.		
86.15	Carry out the project plan to successful completion.		
86.16	Document design problems, test results, product defects, and resolutions.		
87.0	Manage resources. – The student will be able to:		
87.01	Identify required resources for each stage of the project plan.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	87.02 Determine the methods needed to acquire needed resources.		
	87.03 Demonstrate good judgment in the use of resources.		
	87.04 Recycle and reuse resources where appropriate.		
	87.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.		
88.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:		
	88.01 Identify the proper tool for a given job.		
	88.02 Use tools and machines in a safe manner.		
	88.03 Adhere to laboratory or job site safety rules and procedures.		
	88.04 Identify the application of processes appropriate to the task at hand.		
	88.05 Identify materials appropriate to their application.		
89.0	Demonstrate an understanding of the software development process. – The student will be able to:		
	89.01 State the goals of the software application clearly.		
	89.02 Identify and write a plan to achieve each goal.		
	89.03 Develop a list of materials and content required for each goal.		
	89.04 Develop a step-by-step procedure for developing the application.		
	89.05 Follow a written procedure.		
	89.06 Record data from evaluation activities.		
	89.07 Document conclusions and solutions based on evaluation results, observations and data.		
	89.08 Document progress using a project log.		
	89.09 Write an abstract describing the project plan.		
90.0	Research content related to the project and document the results following industry conventions. – The student will be able to:		
	90.01 Identify the basic research needed to develop the project plan.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
90.02	Identify available resources for completing background research required in the project plan.		
90.03	Demonstrate the ability to locate resource materials in a library, database, Internet and other research resources.		
90.04	Demonstrate the ability to organize information retrieval.		
90.05	Demonstrate the ability to prepare a topic outline.		
90.06	Write a draft of the research report.		
90.07	Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.		
90.08	Prepare an electronically composed research paper in proper form.		
90.09	Conduct an alpha and beta evaluation of the project's product.		
90.10	Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.		
91.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:		
91.01	Prepare a multi-media presentation on the completed project.		
91.02	Make an oral presentation about the project using the multi-media materials.		
91.03	Review the presentation, and make changes in the delivery method(s) to improve presentation skills.		
92.0	Demonstrate competency in the area of expertise related to developing computer software using the .NET framework. – The student will be able to:		
92.01	Demonstrate a mastery of the content of the selected subject area.		
92.02	Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.		
92.03	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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. Secondary or postsecondary students who have previously completed the Software Development Core will not have to repeat the core. 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	Introduction to Information Technology	1 credit	15-1151	2	VO
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	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%
9007210	3/87 3%	8/80 10%	3/83 4%	5/69 7%	5/67 7%	4/69 6%	4/82 5%	8/66 12%	7/74 9%	5/72 7%	5/70 7%
9007220	22/87 25%	22/80 28%	2/83 2%	21/69 30%	2/67 3%	22/69 32%	2/82 2%	17/66 26%	2/74 3%	21/72 29%	20/70 29%
9007230	21/87 24%	21/80 26%	1/83 1%	20/69 29%	1/67 1%	21/69 30%	1/82 1%	16/66 27%	1/74 1%	20/72 28%	20/70 29%
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%	0/70 0%
9007530	1/87 1%	0/80 0%	1/83 1%	1/69 1%	1/67 1%	1/69 1%	1/82 1%	1/66 2%	1/74 1%	1/72 1%	0/70 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%	40/45 0%
9007210	21/67 31%	15/75 20%	17/54 31%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007220	11/67 16%	19/75 25%	9/54 17%	9/46 17%	0/45 0%	0/45 0%	0/45 0%
9007230	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007510	4/67 6%	3/75 4%	2/54 4%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007520	8/67 12%	12/75 16%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
9007530	3/67 4%	2/75 3%	1/54 2%	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.

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 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 Demonstrate comprehension and communication skills.
06.0 Use technology to enhance the effectiveness of communication skills.
07.0 Develop an awareness of management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Practice quality performance in the learning environment and the workplace.
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 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
11.0 Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals.
12.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
13.0 Demonstrate human relations/interpersonal skills appropriate for the workplace.
14.0 Participate in work-based learning experiences.
15.0 Perform e-mail activities.
16.0 Demonstrate knowledge of different operating systems.
17.0 Demonstrate proficiency navigating the internet, intranet, and the WWW.
18.0 Demonstrate proficiency using HTML commands.
19.0 Demonstrate proficiency in page design applicable to the WWW.
20.0 Demonstrate proficiency using specialized web design software.
21.0 Develop an awareness of the information technology industry.
22.0 Develop an awareness of microprocessors and digital computers.
23.0 Develop an awareness of programming languages.
24.0 Develop an awareness of emerging technologies.
25.0 Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model.
26.0 Demonstrate proficiency using common software applications.
27.0 Demonstrate proficiency using specialized software applications
28.0 Demonstrate language arts knowledge and skills.
29.0 Demonstrate mathematics knowledge and skills.
30.0 Demonstrate science knowledge and skills.
31.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development.

32.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types.
33.0 Distinguish between iterative and non-iterative program control structures.
34.0 Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages.
35.0 Describe the processes, methods, and conventions for software development and maintenance.
36.0 Explain the types, uses, and limitations of testing for ensuring quality control.
37.0 Create a program design document using Unified Modeling Language (UML) or other common design tool.
38.0 Describe information security risks, threats, and strategies associated with software development.
39.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
40.0 Solve problems using critical thinking skills, creativity and innovation.
41.0 Use information technology tools.
42.0 Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Application Development & Programming.
43.0 Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Application Development & Programming.
44.0 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.
45.0 Design a computer program to meet specific physical, operational, and interaction criteria.
46.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
47.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
48.0 Create a unit test plan, implement the plan, and report the results of testing.
49.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
50.0 Describe the importance of professional ethics and legal responsibilities.
51.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
52.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
53.0 Design, document, and create object-oriented computer programs.
54.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
55.0 Demonstrate proficiency using HTML and XHTML to create web content.
56.0 Demonstrate proficiency using cascading style sheets (CSS) to format web pages.
57.0 Demonstrate proficiency using basic client-side scripting to control the content and the behavior of HTML and XHTML documents.
58.0 Demonstrate an understanding of JavaScript programming fundamentals.
59.0 Demonstrate proficiency in assigning and handling variables in JavaScript programs and functions.
60.0 Use event handlers in JavaScript programs and functions.
61.0 Recognize and assign data types appropriate to their use.
62.0 Demonstrate proficiency in using appropriate operators to achieve a planned output.
63.0 Write executable statements.
64.0 Demonstrate an understanding of variable scope.
65.0 Use good programming practices.
66.0 Demonstrate use of the Document Object Module (DOM).
67.0 Use conditional control statements in JavaScript.
68.0 Use iterative control statements in JavaScript.
69.0 Use nested loop iterative control statements in JavaScript.

70.0 Use JavaScript to produce input and output for programs.
71.0 Demonstrate proficiency in using Form Objects in JavaScript programs and functions.
72.0 Demonstrate proficiency in using methods in JavaScript programs and functions.
73.0 Demonstrate proficiency in using parameters in JavaScript programs and functions.
74.0 Utilize debugging techniques in programs.
75.0 Recognize security risks in programs.
76.0 Use plug-ins and libraries.
77.0 Demonstrate proficiency in programming for mobile delivery technology (e.g., iPhone/Android).
78.0 Demonstrate an understanding of Personal Home Page (PHP) programming language.
79.0 Demonstrate proficiency in PHP configuration.
80.0 Demonstrate an understanding of PHP language basics.
81.0 Demonstrate proficiency in the use of server processes.
82.0 Demonstrate an understanding of object-oriented programming in PHP.
83.0 Demonstrate proficiency in writing PHP code to handle file input/output (I/O) operations.
84.0 Demonstrate proficiency in creating, populating, and using arrays in PHP.
85.0 Demonstrate proficiency handling strings in PHP.
86.0 Demonstrate proficiency in using PHP to access databases via Open Database Connectivity (ODBC).
87.0 Demonstrate proficiency in applying best practices for ensuring creation of a secure program.
88.0 Demonstrate an understanding of key technologies, protocols, and architectures associated with web development and programming.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Information Technology**
Course Number: **8207310**
Course Credit: **1**

Course Description:

This course is designed to provide an introduction to information technology concepts and careers as well as the impact information technology has on the world, people, and industry and basic web design concepts. The content includes information technology career research; operating systems and software applications; electronic communications including e-mail and Internet services; basic HTML, DHTML, and XML web commands and design; and emerging technologies and web page design. After successful completion of Introduction to Information Technology, students will have met Occupational Completion Point A, Information Technology Assistant, SOC Code 15-1151.

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 the program in which the BTE Core is associated.		
	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 the program in which the BTE Core is associated.		
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 the program in which the BTE Core is associated.		
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

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:		SC.912.L.14.12, 16, 16.10, 17.11, 13, 15, 16, 19, 20; SC.912.N.1.1, 3, 4, 7, 2.2, 5, 3.5, 4.2, 4
04.01 Develop keyboarding skills to enter and manipulate text and data.	LAFS.910.SL.2.5, LAFS.1112.SL.2.5, LAFS.910.W.2.6, LAFS.1112.W.2.6, LAFS.910.SL.1.2, LAFS.1112.SL.1.2, LAFS.910.L.1.2, LAFS.1112.L.1.2	
04.02 Describe and use current and emerging computer technology and software to perform personal and business related tasks.	LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.910.SL.2.4, LAFS.910.SL.2.5, LAFS.910.SL.2.6, LAFS.910.W.1.2, LAFS.910.W.2.6, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112.SL.1.3, LAFS.1112.SL.2.4, LAFS.1112.SL.2.5, LAFS.1112.SL.2.6, LAFS.1112.W.1.2, LAFS.1112.W.2.6	
04.03 Identify and describe communications and networking systems used in workplace environments.	LAFS.910.RI.2.4, LAFS.1112.RI.2.4, LAFS.910.SL.1.2, LAFS.1112.SL.1.2, LAFS.910.W. 2.4, LAFS.910.W. 2.5, LAFS.910.W. 2.6, LAFS.1112.W. 2.4, LAFS.1112.W. 2.5, LAFS.1112.W. 2.6, LAFS.910.W.3.8, LAFS.1112.W.3.8	
04.04 Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available for application software.	LAFS.910.RI.1.1, LAFS.910.RI.1.2, LAFS.910.RI.1.3, LAFS.910.RI.2.4, LAFS.910.RI.2.5, LAFS.910.RI.2.6, LAFS.910.RI.3.7, LAFS.1112.RI.1.1, LAFS.1112.RI.1.2, LAFS.1112.RI.1.3, LAFS.1112.RI.2.4, LAFS.1112.RI.2.5, LAFS.1112.RI.2.6, LAFS.1112.RI.3.7, LAFS.910.RI.4.10, LAFS.1112.RI.4.10	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
04.05	Troubleshoot problems with computer hardware peripherals and other office equipment.	LAFS.910.SL1.1, LAFS.1112.SL.1.1, LAFS.910.SL.2.5, LAFS.1112.SL.2.5	
04.06	Describe ethical issues and problems associated with computers and information systems.	LAFS.910.RI.4.10, LAFS.1112.RI.4.10, LAFS.910.RI.1.1, LAFS.910.RI.1.2, LAFS.910.RI.1.3, LAFS.1112.RI.1.1, LAFS.1112.RI.1.2, LAFS.1112.RI.1.3, LAFS.910.RI.3.8, LAFS.1112.RI.3.8, LAFS.910.W.3.8, LAFS.1112.W.3.8, LAFS.910.W.1.1, LAFS.1112.W.1.1, LAFS.910.W.1.2, LAFS.1112.W.1.2, LAFS.910.SL.1.1, LAFS.910.SL.1.2, LAFS.910.SL.1.3, LAFS.910.SL.2.4, LAFS.910.SL.2.5, LAFS.910.SL.2.6, LAFS.1112.SL.1.1, LAFS.1112.SL.1.2, LAFS.1112.SL.1.3, LAFS.1112.SL.2.4, LAFS.1112.SL.2.5, LAFS.1112.SL.2.6	
05.0	Demonstrate comprehension and communication skills – the student will be able to:		
05.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
05.02	Organize ideas and communicate oral and written messages appropriate for information technology environments.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
05.03	Collaborate with individuals and teams to complete tasks and solve information technology problems.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
05.04	Identify, define, and discuss professional information technology terminology appropriate for internal and external communications in an information technology environment.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L 2.3, 3.4, 3.5, 3.6	
05.05	Apply the writing process to the creation of appropriate documents following designated business formats.	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L.1.1, 1.2 LAFS.1112.L1.1, 1.2	
	05.06 Demonstrate an awareness of project management concepts and tools (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration).	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
06.0	Use technology to enhance the effectiveness of communication skills – the student will be able to:		SC.912.N.1.1, 4, 2.2, 3.5
	06.01 Use database, spreadsheet, presentation software, scheduling, and integrated software packages to enhance communication.	LAFS.910.RI.4.1 LAFS.910.W.4.1 LAFS.1112.RI.4.1 LAFS.1112.W.4.1 MAFS 912.A-CED.1.1	
	06.02 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.	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.L.1.1, 1.2 LAFS.1112.L1.1, 1.2	
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles – the student will be able to:		
	07.01 Explore, design, implement, and evaluate organizational structures and cultures.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
	07.02 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.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
	07.03 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.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
08.0	Practice quality performance in the learning environment and the workplace – the student will be able to:		
	08.01 Assess personal, peer and group performance and identify and implement strategies for improvement (e.g., organizational skills, note taking/outlining, advance organizers, reasoning skills,	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	problem-solving skills, and decision-making skills).	LAFS.910.W.3.7, 3.8, 4.1 LAFS.1112.W.3.7, 3.8, 4.1	
08.02	Develop criteria for assessing products and processes that incorporate effective business practices (e.g., time management, productivity, total quality management).	LAFS.910.SL.1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL1.2, 1.3, 2.4, 2.5, 2.6	
09.0	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:		
09.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.	LAFS.910.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
10.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance – the student will be able to:		
10.01	Analyze, interpret, compile, and demonstrate the ability to present/communicate data in understandable and measurable terms using common statistical procedures.	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1 MAFS 912.S-ID.1.1 MAFS.9.12.A-APR.4.6 MAFS.912.A-CED.1.3 MAFS.912.S-MD.2.5 B	
10.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	SC.912.N.1.5
10.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas when appropriate.	LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1 MAFS.912.A-CED.1.1, 1.3, 1.4 MAFS 912.A-REI.2.3	
11.0	Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals – the student will be able to:		
11.01	Use personal assessment tools to identify personal strengths and weaknesses related to learning and work environments.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.RI. 4.1	
11.02 Analyze job and career requirements and relate career interests to opportunities in the global economy.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.0 Incorporate knowledge gained from individual assessment and job/career exploration to 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:		
12.01 Research, compare, and contrast information technology career clusters (e.g., characteristics needed, skills required, education required, industry certifications, advantages and disadvantages of information technology careers, the need for information technology workers).	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
12.02 Describe the variety of occupations and professions within the world of information technology including those where information technology is either in a primary focus or in a supportive role.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.03 Describe job requirements for the variety of occupations and professions within the global world of information technology.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.04 Analyze personal skills and aptitudes in comparison with information technology career opportunities.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
12.05 Refine and implement a plan to facilitate personal growth and skill development related to information technology career opportunities.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	12.06 Develop and maintain an electronic career portfolio, to include, but not limited to the Resume and Letter of Application.	LAFS.910.SL.1.2 LAFS.1112.SL.1.2 LAFS.910.RI.4.1 LAFS.1112.RI. 4.1 LAFS.910.W. 4.1 LAFS.1112.W. 4.1	
13.0	Demonstrate human relations/interpersonal skills appropriate for the workplace – the student will be able to:		
	13.01 Accept constructive criticism.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
	13.02 Demonstrate personal and interpersonal skills appropriate for the workplace (e.g., responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, professional dress).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
14.0	Participate in work-based learning experiences – the student will be able to:		
	14.01 Participate in work-based learning experiences in an information technology environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
	14.02 Discuss the use of technology in an information technology environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	
15.0	Perform e-mail activities – the student will be able to:		SC.912.N.1.1, 4, 3.5, 4.1,2
	15.01 Describe e-mail capabilities and functions.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.02 Identify components of an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.03 Identify the components of an e-mail address.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.04 Identify when to use different e-mail options.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.05 Attach a file to an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.06 Forward an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.07 Use an address book.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.08 Reply to an e-mail message.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.09 Use the Internet to perform e-mail activities.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.10 Identify the appropriate use of e-mail and demonstrate related e-mail etiquette.	LAFS.910.W.4.1 LAFS.1112.W.4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	15.11 Identify when to include information from an original e-mail message in a response.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	15.12 Identify common problems associated with widespread use of e-mail.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
16.0	Demonstrate knowledge of different operating systems – the student will be able to:		
	16.01 Identify operating system file naming conventions.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	16.02 Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	16.03 Demonstrate a working knowledge of standard file formats.	LAFS.910.W.4.1 LAFS.1112.W.4.1	
	16.04 Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
17.0	Demonstrate proficiency navigating the internet, intranet, and the WWW – the student will be able to:		
	17.01 Identify and describe Web terminology.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.02 Demonstrate proficiency in using the basic features of GUI browsers (e.g., setting bookmarks, basic configurations, e-mail configurations, address book).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.03 Define Universal Resource Locators (URLs) and associated protocols (e.g., .com, .org, .edu, .gov, .net, .mil).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
	17.04 Describe and observe Internet/Intranet ethics and copyright laws and regulatory control.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
17.05	Trace the evolution of the Internet from its inception to the present and into the future.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
17.06	Demonstrate proficiency using search engines (e.g., Yahoo!, Google).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.07	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L. 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	
17.08	Identify effective Boolean search strategies.	LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
18.0	Demonstrate proficiency using HTML commands – the student will be able to:		
18.01	Identify elements of a Web page.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.02	Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.03	Define basic HTML terminology.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.04 Analyze HTML source code developed by others.	LAFS.910.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.1112.RL.1.1,1.2,1.3,2.4,2.6,3.7,3.9,4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910.L.2.3 LAFS.1112.L.2.3	
18.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.07 Edit and test HTML documents for accuracy and validity.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.08 Use basic functions of WYSIWYG editors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.09 Use basic functions of HTML, DHTML, and XML editors and converters.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
18.10 Enhance web pages through the addition of images and graphics including animation.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
19.0	Demonstrate proficiency in page design applicable to the WWW – the student will be able to:		
19.01	Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.02	Describe and apply color theory as it applies to Web page design (e.g., background and text color).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.04	Use image design software to create and edit images.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.05 Demonstrate proficiency in publishing to the Internet.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
19.06 Demonstrate proficiency in adding downloadable forms to web pages.	LAFS.910.L. 2.3, 3.4, 3.5, 3.6 LAFS.1112.L 2.3, 3.4, 3.5, 3.6	
19.07 Explain the need for web-based applications.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	
20.0 Demonstrate proficiency using specialized web design software – the student will be able to:		
20.01 Compare and contrast various specialized web design software (e.g., Flash, Shockwave, GoLive, Director).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
20.02 Demonstrate proficiency using use of various specialized web design software (e.g., Flash, Shockwave, GoLive, Director).	LAFS.910.W.4.1 LAFS.1112.W.4.1 LAFS.910.RI.4.1 LAFS.1112.RI.4.1	
21.0 Develop an awareness of the information technology industry – the student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
21.01 Explain how information technology impacts the operation and management of business and society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
21.02 Explain the emergence of e-commerce and e-government and the potential impact on business and society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
21.03 Explain the emergence of a paperless society.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.0 Develop an awareness of microprocessors and digital computers – the student will be able to:		
22.01 Describe the evolution of the digital computer.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.02 Explain the general architecture of a microcomputer system.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.03 Explain the evolution of microprocessors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.04 Explain software hierarchy and its impact on microprocessors.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.05 Explain the need for and use of peripherals.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.06 Demonstrate proficiency using peripherals.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.07 Identify the basic concepts of computer maintenance and upgrades.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
22.08 Differentiate between diagnosing and troubleshooting.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.0 Develop an awareness of programming languages – the student will be able to:		
23.01 Explain the history of programming languages.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.02 Explain the need for and use of compilers.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.03 Explain how compilers work.	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
23.04 Identify the three types of programming design approaches (e.g., top-down, structured, and object-oriented).	LAFS.910.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.1112.L.1.1, 1.2, 1.3, 2.3, 3.4, 3.5, 3.6 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.1.1,1.2,1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.W.1.1,1.2,1.3, 2.4, 2.5, 2.6,3.7, 3.8, 3.9, 4.1 LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
24.0 Develop an awareness of emerging technologies – the student will be able to:		
24.01 Compare and contrast various methods of evaluation for emerging technologies.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
24.02 Demonstrate knowledge of the process of planning upgrades and changeovers.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
24.03 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.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.0 Demonstrate an understanding of the seven layers of the Open Systems Interface (OSI) model – the student will be able to:		
25.01 Identify how types of networks and how they work.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
	LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.02 Identify the role of servers and clients on a network.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.03 Identify benefits and risks of networked computing.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.04 Identify the relationship between computer networks and other communications networks (i.e. telephone systems).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.05 Identify Intranets, Extranets and how they relate to the Internet.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.06 Demonstrate basic understanding of network administration.	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.4.1 LAFS.1112.W4.1 LAFS.910.L.2.3, 3.4, 3.6 LAFS.1112.L.2.3, 3.4, 3.6	
25.07 Describe the evolution of OSI from its inception to the present and into the future.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
25.08 Explain the interrelations of the seven layers of the Open Systems Interface (OSI) as it relates to hardware and software.	LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.910.W.4.1 LAFS.1112.W4.1 LAFS.910.L.2.3, 3.4, 3.6 LAFS.1112.L.2.3, 3.4, 3.6	
26.0 Demonstrate proficiency using common software applications – the student will be able to:		
26.01 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,	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	SC.912.N.1.1, 3, 4, 6, 7, 3.5, 4.2; SC.912.P.10.18

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	financial management, Java applet, music).		
26.02	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).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	SC.912.N.1.1, 3, 4, 1.7, 3.5;
27.0	Demonstrate proficiency using specialized software applications – the student will be able to:		
27.01	Compare and contrast the appropriate use of specialized software applications (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation process control, materials management).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
27.02	Demonstrate awareness of specialized software applications (e.g., OLTP, Computer Aided Design, Computer Aided Manufacturing, 3D animation, process control, materials management).	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1	
27.03	Demonstrate the ability to incorporate digital sound.	LAFS.910.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.1112.RI.1.1, 1.2, 1.3, 2.4, 2.5, 2.6, 3.7, 3.8, 3.9, 4.1 LAFS.910. SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6 LAFS.1112.SL.1.1, 1.2, 1.3, 2.4, 2.5, 2.6	

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
31.0 Explore the characteristics, tasks, work attributes, options, and tools associated with a career in software development. – The student will be able to:		
31.01 Describe the evolution of programming and programming careers.	MAFS.912.A-REI.1.1	
31.02 Identify tasks performed by programmers.	MAFS.912.N-Q.1.1	
31.03 Describe how businesses use computer programming to solve business problems.	MAFS.912.A-REI.1.1	
31.04 Investigate job opportunities in the programming field.		
31.05 Explain different specializations and the related training in the computer programming field.	MAFS.912.A-REI.1.1 MAFS.912.G-SRT.1.2	
31.06 Explain the need for continuing education and training of computer programmers.	MAFS.912.A-REI.1.1	
31.07 Explain enterprise software systems and how they impact business.	MAFS.912.A-REI.1.1	
31.08 Describe ethical responsibilities of computer programmers.	MAFS.912.A-REI.1.1	
31.09 Describe the role of customer support to software program quality.	MAFS.912.A-REI.1.1	
31.10 Identify credentials and certifications that may improve employability for a computer programmer.	MAFS.912.N-Q.1.1	
31.11 Identify devices, tools, and other environments for which programmers may develop software.	MAFS.912.G-CO.4.12; MAFS.912.N-Q.1.1	
32.0 Demonstrate an understanding of the characteristics, use, and selection of numerical, non-numerical, and logical data types. – The student will be able to:		
32.01 Identify the characteristics (e.g., size, limits) and uses of different numerical and non-numerical data types.	MAFS.912.N-Q.1.2	
32.02 Explain the types and uses of variables in programs.	MAFS.912.A-REI.1.1; MAFS.912.A-SSE.1.1	
32.03 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
32.04	Identify the types of operations that can be performed on different data types.	MAFS.912.N-Q.1.1	
32.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
32.06	Explain how computers store different data types in memory.	MAFS.912.A-REI.1.1	
32.07	Use different number systems to represent data.	MAFS.912.N-Q.1.1	
32.08	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.	MAFS.912.A-REI.1.1	
32.09	Use Boolean logic to perform logical operations.		
33.0	Distinguish between iterative and non-iterative program control structures.		
33.01	Explain non-iterative programming structures (e.g., if, if/else) and their uses.	MAFS.912.A-REI.1.1	
33.02	Explain iterative programming structures (e.g., while, do/while) and their uses.	MAFS.912.A-REI.1.1	
34.0	Differentiate among high level, low level, procedural, object-oriented, compiled, interpreted, and translated programming languages. – The student will be able to:		
34.01	Identify the characteristics, uses, and limits of low-level programming languages.	MAFS.912.N-Q.1.1	
34.02	Identify the characteristics, uses, and limits of high-level programming languages.	MAFS.912.N-Q.1.1	
34.03	Identify the characteristics, uses, and limits of rapid development programming languages.	MAFS.912.N-Q.1.1	
34.04	Describe object-oriented concepts.	MAFS.912.A-REI.1.1	
34.05	Explain the characteristics of procedural and object-oriented programming languages.	MAFS.912.A-REI.1.1	
34.06	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	
35.0	Describe the processes, methods, and conventions for software development and maintenance. – The student will be able to:		
35.01	Describe and explain tools used in software development.	MAFS.912.A-REI.1.1; MAFS.912.G-CO.4.12	
35.02	Describe the stages of the program life cycle.	MAFS.912.A-REI.1.1	
35.03	Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).	MAFS.912.G-SRT.1.2	
35.04	List and explain the steps in the program development cycle.	MAFS.912.A-REI.1.1, MAFS.912.N-Q.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
35.05	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	
35.06	Describe the on-going need for program maintenance.	MAFS.912.A-REI.1.1	
35.07	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	
35.08	Describe different methods used to facilitate version control and change management.	MAFS.912.A-REI.1.1; MAFS.912.G-SRT.1.2	
36.0	Explain the types, uses, and limitations of testing for ensuring quality control. – The student will be able to:		
36.01	Explain the uses and limits of testing in ensuring program quality.	MAFS.912.A-REI.1.1	
36.02	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	
36.03	Describe data and the use of test plans/scripts to be used in program testing.	MAFS.912.A-REI.1.1	
36.04	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	
36.05	Identify the data to be used for boundary conditions.	MAFS.912.N-Q.1.1	
36.06	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	
37.0	Create a program design document using Unified Modeling Language (UML) or other common design tool. – The student will be able to:		
37.01	Describe different design methodologies and their uses (e.g., object-oriented design, structured design, and rapid application development).	MAFS.912.A-REI.1.1	
37.02	Describe tools for developing a program design (e.g., UML, flowcharts, design documents, pseudocode).	MAFS.912.A-REI.1.1, MAFS.912.G-CO.4.12	
37.03	Explain the role of existing libraries and packages in facilitating programmer productivity.	MAFS.912.A-REI.1.1	
37.04	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	
37.05	Write a program design document using UML or other standard design methodology.	MAFS.912.A-CED.1.1	
37.06	Define input and output for a program module using UML or other standard design methodology.	MAFS.912.F-IF.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
38.0	Describe information security risks, threats, and strategies associated with software development. – The student will be able to:		
38.01	Explain the security risks to personal and business computer users.	MAFS.912.S-IC.2.6	
38.02	Identify different types of threats to computer systems.	MAFS.912.N-Q.1.1	
38.03	Identify methods to protect against different threats to computer systems.	MAFS.912.N-Q.1.1	
38.04	Understand the importance of a disaster/emergency response plan.		
38.05	Identify alternative methods for data storage and backup (e.g., mirroring, fail-over, high availability, types of backups).	MAFS.912.N-Q.1.1	
39.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:		
39.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.		
39.02	Locate, organize and reference written information from various sources.		
39.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.	MAFS.912.A-CED.1.1	
39.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.	MAFS.912.G-SRT.1.2	
39.05	Apply active listening skills to obtain and clarify information.		
39.06	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	
39.07	Exhibit public relations skills that aid in achieving customer satisfaction.		
40.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:		
40.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.	MAFS.912.G-CO.3.9	
40.02	Employ critical thinking and interpersonal skills to resolve conflicts.	MAFS.912.G-CO.3.9	
40.03	Identify and document workplace performance goals and monitor progress toward those goals.	MAFS.912.N-Q.1.1	
40.04	Conduct technical research to gather information necessary for decision-making.	MAFS.912.S-IC.2.6; MAFS.912.S-IC.1.1	
41.0	Use information technology tools. – The student will be able to:		
41.01	Use personal information management (PIM) applications to increase workplace efficiency.		

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.G-CO.4.12	
41.03	Employ computer operations applications to access, create, manage, integrate, and store information.	MAFS.912.A-CED.1.1	
41.04	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 #
42.0	Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Application Development & Programming.		
42.01	Key Ideas and Details		
	42.01.1	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	
	42.01.2	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	
	42.01.3	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	
42.02	Craft and Structure		
	42.02.1	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	
	42.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	42.02.3	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	
42.03	Integration of Knowledge and Ideas		
	42.03.1	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	
	42.03.2	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	
	42.03.3	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	
42.04	Range of Reading and Level of Text Complexity		
	42.04.1	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.	
	42.04.2	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	
43.0	Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Application Development & Programming.		
43.01	Text Types and Purposes		
	43.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	43.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
43.02	Production and Distribution of Writing		
	43.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	43.02.2	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	
	43.02.3	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	
	43.03	Research to Build and Present Knowledge	
	43.03.1	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	
	43.03.2	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	
	43.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	43.04	Range of Writing	
	43.04.1	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	
44.0	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.		
	44.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	44.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	44.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	44.04	Model with mathematics. MAFS.K12.MP.4.1	
	44.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	44.06	Attend to precision. MAFS.K12.MP.6.1	
	44.07	Look for and make use of structure.	

Florida State Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.7.1	
44.08 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
45.0 Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:		
45.01 Choose appropriate data types depending on the needs of the program.	MAFS.912.N-Q.1.1	
45.02 Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).	MAFS.912.N-Q.1.2	
45.03 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	
45.04 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	
45.05 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	
46.0 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:		
46.01 Use appropriate naming conventions to define program variables and modules (methods, functions).	MAFS.912.N-Q.1.1	
46.02 Use a program editor to write the source code for a program.	MAFS.912.A-REI.1.1	
46.03 Write programs that use selection structures (e.g., if, if/else).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.04 Write programs that use repetition structures (e.g., while, do/while).	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.05 Write programs that use nested structures.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
46.06 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.		
46.07 Compile and run programs.	MAFS.912.A-REI.1.1	
46.08 Write programs that use standard arithmetic operators with different numerical data types.	MAFS.912.N-Q.1.1; MAFS.912.A-CED.1.1;	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
		MAFS.912.A-CED.1.2 MAFS.912.A-REI.1.2, MAFS.912.A-REI.2.3	
	46.09 Write programs that use standard logic operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	46.10 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	
	46.11 Write programs that perform data conversion between standard data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	46.12 Write programs that define, use, search, and sort arrays.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	46.13 Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	46.14 Demonstrate understanding and use of appropriate variable scope.	MAFS.912.A-REI.1.1	
47.0	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:		
	47.01 Write programs that perform user input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.02 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	
	47.03 Write program modules such as functions, subroutines, or methods.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.04 Write program modules that accept arguments.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.05 Write program modules that return values.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.06 Write program modules that validate arguments and return error codes.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.07 Write interactive programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.08 Write programs that use standard libraries to enhance program function.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
	47.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.		
48.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:		
	48.01 Write a unit test plan that identifies the input data and expected results for program tests.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
48.02	Test and debug programs, including programs written by others.	MAFS.912.A-REI.1.1	
48.03	Write a test report that identifies the results of testing.	MAFS.912.A-REI.1.1	
48.04	Trace through the function of a program to ensure valid operation.	MAFS.912.N-Q.1.1	
48.05	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	
48.06	Create a disaster / emergency response plan for a computer system.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
49.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:		
49.01	Employ leadership skills to accomplish organizational goals and objectives.		
49.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.		
49.03	Conduct and participate in meetings to accomplish work tasks.		
50.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:		
50.01	Evaluate and justify decisions based on ethical reasoning.	MAFS.912.S-IC.2.6	
50.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.	MAFS.912.S-IC.2.6	
50.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.	MAFS.912.N-Q.1.1; 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 #
42.0	Methods and strategies for using Florida State Standards for grades 11-12 reading in Technical Subjects for student success in Web Application Development & Programming.		
42.01	Key Ideas and Details		
	42.01.1	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	
	42.01.2	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	
	42.01.3	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	
42.02	Craft and Structure		
	42.02.1	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	
	42.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	42.02.3	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	
42.03	Integration of Knowledge and Ideas		
	42.03.1	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	
	42.03.2	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	
	42.03.3	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	
42.04	Range of Reading and Level of Text Complexity		
	42.04.1	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.	
	42.04.2	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	
43.0	Methods and strategies for using Florida State Standards for grades 11-12 writing in Technical Subjects for student success in Web Application Development & Programming.		
43.01	Text Types and Purposes		
	43.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
	43.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
43.02	Production and Distribution of Writing		
	43.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
	43.02.2	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	
	43.02.3	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	
	43.03	Research to Build and Present Knowledge	
	43.03.1	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	
	43.03.2	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	
	43.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
	43.04	Range of Writing	
	43.04.1	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	
44.0	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.		
	44.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
	44.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
	44.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
	44.04	Model with mathematics. MAFS.K12.MP.4.1	
	44.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
	44.06	Attend to precision. MAFS.K12.MP.6.1	
	44.07	Look for and make use of structure.	

Florida State Standards	Correlation to CTE Program Standard #
MAFS.K12.MP.7.1	
44.08 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
51.0 Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:		
51.01 Demonstrate the understanding and use of classes, objects, attributes, and behaviors.	MAFS.912.A-REI.1.1	
51.02 Demonstrate the understanding and use of inheritance.	MAFS.912.A-REI.1.1	
51.03 Demonstrate the understanding and use of data encapsulation.	MAFS.912.A-REI.1.1	
51.04 Demonstrate the understanding and use of polymorphism.	MAFS.912.A-REI.1.1	
52.0 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:		
52.01 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	
52.02 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	
52.03 Design an object-oriented program using UML or another standard design methodology.	MAFS.912.A-CED.1.1	
52.04 Work with other team members to develop a project plan for a program.	MAFS.912.A-REI.1.1	
52.05 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	
52.06 Participate in design meetings that review program design documents for conformance to program requirements.	MAFS.912.S.IC.2.6	
52.07 Estimate the time to develop a program or module.	MAFS.912.S.IC.2.6	
53.0 Design, document, and create object-oriented computer programs. – The student will be able to:		
53.01 Compare and contrast recursive functions to other iterative methods.	MAFS.912.G-SRT.1.2	
53.02 Understand the implementation of character strings in the programming language.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
53.03	Write programs that perform string processing (e.g., string manipulation, string compares, concatenation).	MAFS.912.A-REI.1.1	
53.04	Write programs that use user-defined data types.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.05	Write object-oriented programs that use inheritance.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.06	Write object-oriented programs that use polymorphism.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.07	Develop class constructors.	MAFS.912.S-ID.1.3	
53.08	Write programs that define and use program constants.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.09	Write programs that perform error handling.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.10	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	
53.11	Write programs that perform dynamic memory allocation.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.12	Write programs that perform effective management of dynamically allocated memory.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.13	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	
53.14	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	
53.15	Write programs that are event-driven.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
53.16	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	
53.17	Perform basic database commands including connect, open, select, and close.	MAFS.912.A-REI.1.1	
54.0	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:		
54.01	Develop a test plan for an object-oriented program.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
54.02	Write test plans for event-driven programs.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
54.03	Write test plans for programs that perform file input and output.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.2	
54.04	Perform test and debug activities on object-oriented programs, including those written by someone else.	MAFS.912.A-REI.1.1	
54.05	Perform test and debug activities on an event-driven program.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
54.06	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	
54.07	Document the findings of testing in a test report.	MAFS.912.S-CP.1.4	

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
55.0	Demonstrate proficiency using HTML and XHTML to create web content. — The student will be able to:		
55.01	Use storyboarding techniques for designing a Web site (e.g., linear, hierarchical).	MAFS.912.N-Q.1.1	
55.02	Identify elements of a Web page.	MAFS.912.N-Q.1.1	
55.03	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	
55.04	Create Web pages that utilize tables to achieve complex layout.	MAFS.912.N-Q.1.1, MAFS.912.A-CED.1.1	
55.05	Add graphic content to Web pages.	MAFS.912.F-IF.2.4	
55.06	Create Web pages that utilize client-side image maps.	MAFS.912.A-CED.1.1	
55.07	Develop, integrate, and apply the use of forms in Web site design.	MAFS.912.A-CED.1.1; MAFS.912.A-REI.1.1	
55.08	Optimize Web content for desirable search engine placement.		
55.09	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	
55.10	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
55.11	Explain basic XML syntax and how XHTML conforms to the XML standard.	MAFS.912.A-REI.1.1	
55.12	Use a WYSIWYG editor to develop and manage a Web site.		
55.13	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	
55.14	Analyze and modify HTML and XHTML source code developed by others.	MAFS.912.S-MD.2.7	
56.0	Demonstrate proficiency using cascading style sheets (CSS) to format web pages. – The student will be able to:		
56.01	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	
56.02	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	
56.03	Explain the difference between classes, id, and span elements.	MAFS.912.G-SRT.1.2; MAFS.912.A-REI.1.1	
56.04	Utilize CSS properties within Web pages to control page layout, fonts, colors, backgrounds, and other presentation effects.		
56.05	Demonstrate understanding of the Box Model.	MAFS.912.A-REI.1.1	
56.06	Demonstrate proficiency in creating 1 to 3 column layouts.	MAFS.912.A-REI.1.1	
56.07	Create navigation system through CSS.	MAFS.912.A-CED.1.1	
57.0	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:		
57.01	Describe the difference between server-side and client-side processing.	MAFS.912.G-SRT.1.2; MAFS.912.A-REI.1.1	
57.02	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	
57.03	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
58.0	Demonstrate an understanding of JavaScript programming fundamentals. – The student will be able to:		
58.01	Describe server side versus client side applications including interpreters.	MAFS.912.A-REI.1.1	
58.02	Describe the purpose and use of an interpreter in relation to JavaScript.	MAFS.912.A-REI.1.1	
58.03	Describe differences in different types of JavaScript implementations (i.e., Jscript, ECMA).	MAFS.912.A-REI.1.1	
58.04	Declare and initialize variables.	MAFS.912.A-CED.1.2	
58.05	Assign new values to variables.	MAFS.912.A-CED.1.2	
58.06	Create and use constant variables.	MAFS.912.A-CED.1.2	
58.07	Describe the difference of programming languages versus scripting languages.	MAFS.912.A-REI.1.1	
58.08	Describe object based nature and platform independence.	MAFS.912.A-REI.1.1	
58.09	Describe and demonstrate inline scripting.	MAFS.912.A-REI.1.1	
59.0	Demonstrate proficiency in assigning and handling variables in JavaScript programs and functions. – The student will be able to:		
59.01	Describe how variables are used in programs.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
59.02	Identify which data type should be used for a given value.	MAFS.912.N-Q.1.1	
59.03	Identify the syntax for using variables.	MAFS.912.N-Q.1.1	
59.04	Declare and initialize variables.	MAFS.912.A-CED.1.2	
59.05	Assign new values to variables.	MAFS.912.A-CED.1.2	
59.06	Create and use constant variables.	MAFS.912.A-CED.1.2	
59.07	Describe and demonstrate the use of properties.	MAFS.912.A-REI.1.1	
59.08	Describe identifiers and identify valid and invalid identifiers.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
59.09	Describe and identify reserved words, delimiters, literals, and comments.	MAFS.912.A-REI.1.1; MAFS.912.N-Q.1.1	
60.0	Use event handlers in JavaScript programs and functions. – The student will be able to:		
60.01	Describe the event model and five events (form, image, map, link, and window).	MAFS.912.A-REI.1.1	
60.02	Demonstrate and use the window events load, focus, blur, and unload.	MAFS.912.A-REI.1.1	
60.03	Demonstrate and use the form events change, reset, and submit.	MAFS.912.A-REI.1.1	
60.04	Demonstrate and use the text events cut, paste, select, and copy.	MAFS.912.A-REI.1.1	
60.05	Demonstrate and use the mouse events mousemove, mousedown, click, mousewheel,mouseover, mouseout and mouseover.	MAFS.912.A-REI.1.1	
60.06	Demonstrate and use the keyboard events keyup, keydown and keypress.	MAFS.912.A-REI.1.1	
60.07	Demonstrate using the appropriate event handlers with their associated events.	MAFS.912.A-REI.1.1	
61.0	Recognize and assign data types appropriate to their use. – The student will be able to:		
61.01	Describe the data type categories.	MAFS.912.A-REI.1.1	
61.02	Give examples of var, primitives, null, and undefined data types.	MAFS.912.N-Q.1.1	
61.03	Demonstrate the use of var in relation to other datatypes.	MAFS.912.A-REI.1.1; MAFS.912.A-CED.1.2	
62.0	Demonstrate proficiency is using appropriate operators to achieve a planned output. – The student will be able to:	MAFS.912.F-BF.1.2	
62.01	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
62.02 Construct statements using relational operators.	MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.3	
62.03 Construct and use statements using logical operators.	MAFS.912.S-CP.1.4	
62.04 Construct and use statements using string concatenation, and strict comparison.	MAFS.912.S-CP.1.1	
62.05 Construct and use statements using assignment operators.	MAFS.912.A-CED.1.4	
62.06 Construct and execute statements using operator precedence.	MAFS.912.A-APR.4.7	
63.0 Write executable statements. – The student will be able to:		
63.01 Construct variable assignment statements.	MAFS.912.A-CED.1.2	
63.02 Construct statements using built-in functions.	MAFS.912.F-BF.1.1	
63.03 Describe when implicit data type conversions take place.	MAFS.912.A-REI.1.1	
63.04 List the drawbacks of implicit data type conversions.	MAFS.912.A-REI.1.1	
63.05 Construct statements using functions to explicitly convert data types.	MAFS.912.F-BF.1.1	
64.0 Demonstrate an understanding of variable scope. – The student will be able to:		
64.01 Understand the scope and visibility of variables.	MAFS.912.A-CED.1.2	
64.02 Write programs using local variables.	MAFS.912.A-REI.1.1	
64.03 Describe the scope of a variable.	MAFS.912.A-REI.1.1	
65.0 Use good programming practices. – The student will be able to:		
65.01 List examples of good programming practices.	MAFS.912.A-REI.1.1	
65.02 Insert comments into code.	MAFS.912.A-REI.1.1	
65.03 Demonstrate the use of <no script> tag.	MAFS.912.A-REI.1.1	
65.04 Follow formatting guidelines when writing code.	MAFS.912.N-Q.1.1	
65.05 Understand the different types of errors produced by programs.	MAFS.912.A-REI.1.1	
66.0 Demonstrate use of the Document Object Module (DOM. – The student will be able to:		
66.01 Create and use user defined objects.	MAFS.912.A-CED.1.2	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
66.02	Create user defined objects with properties and methods.	MAFS.912.A-CED.1.2	
66.03	Describe and Use the Array Object including its parameters, properties, and methods (chop, join, pop, push, splice, split).	MAFS.912.A-REI.1.1	
66.04	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	
66.05	Describe and use the Window Object including \properties, and methods.	MAFS.912.A-REI.1.1	
66.06	Describe and use the Image Object including its properties, and methods.	MAFS.912.A-REI.1.1	
66.07	Describe and use the History Object including its properties, and methods.	MAFS.912.A-REI.1.1	
66.08	Describe and use the RegEx Object for basic and complex regular expressions.	MAFS.912.A-REI.1.1	
66.09	Describe and use the String Object including its properties, and methods.	MAFS.912.A-REI.1.1	
66.10	Describe and use the Math Object including its properties, and methods.	MAFS.912.A-REI.1.1	
67.0	Use conditional control statements in JavaScript. – The student will be able to:		
67.01	Construct and use an if statement.	MAFS.912.S-CP.1.1	
67.02	Construct and use a switch statement.	MAFS.912.S-CP.1.1	
67.03	Construct and use a while, do while, and for loop.	MAFS.912.S-CP.1.1	
67.04	Construct and use a conditional operator.	MAFS.912.S-CP.1.1	
68.0	Use iterative control statements in JavaScript. – The student will be able to:		
68.01	Describe the types of loop statements and their uses.	MAFS.912.A-REI.1.1	
68.02	Construct and use the while and do while loop.	MAFS.912.F-BF.1.2	
68.03	Construct and use the for loop.	MAFS.912.F-BF.1.2	
68.04	Describe when a while loop is used.	MAFS.912.A-REI.1.1	
68.05	Describe when a for loop is used.	MAFS.912.A-REI.1.1	
69.0	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	
70.0	Use JavaScript to produce input and output for programs. – The student will be able to:		
	70.01 Describe and use the prompt() and confirm() to input data into programs.	MAFS.912.A-REI.1.1	
	70.02 Describe and demonstrate the use of the alert() to produce output to the console.	MAFS.912.A-REI.1.1	
	70.03 Describe and demonstrate how to input data using JavaScript Events.	MAFS.912.A-REI.1.1	
	70.04 Describe and demonstrate how to output using the document.write().	MAFS.912.A-REI.1.1	
	70.05 Explain the difference of prompt() and confirm() functions.	MAFS.912.A-REI.1.1	
	70.06 Create and use escape sequences.		
71.0	Demonstrate proficiency in using Form Objects in JavaScript programs and functions. – The student will be able to:		
	71.01 Use Form objects to validate input.		
	71.02 Access the value of the form object through its associated method.	MAFS.912.N-Q.1.1	
	71.03 Describe and use button, checkbox, textarea, select, radio, hidden, and text objects.	MAFS.912.A-REI.1.1	
	71.04 Access and modify values and attributes at runtime using getElementbyId, getElementsbyName, getElementsbyTagName, and inner HTML.		
72.0	Demonstrate proficiency in using methods in JavaScript programs and functions. – The student will be able to:		
	72.01 Differentiate between anonymous methods and methods.	MAFS.912.N-Q.1.1	
	72.02 Identify the benefits of using methods.	MAFS.912.N-Q.1.1	
	72.03 Describe and use inner method.	MAFS.912.A-REI.1.1	
	72.04 Create a method.	MAFS.912.F-BF.1.2	
	72.05 Describe how a method is invoked.	MAFS.912.A-REI.1.1	
73.0	Demonstrate proficiency in using parameters in JavaScript programs and functions. – The student will be able to:		
	73.01 Describe how parameters are passed into functions.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
73.02 Define a parameter.	MAFS.912.A-REI.1.1	
73.03 Create a method using a parameter.	MAFS.912.F-BF.1.2	
73.04 Invoke a method that has parameters.	MAFS.912.F-BF.1.2	
73.05 Distinguish between formal and actual parameters.	MAFS.912.A-REI.1.1	
74.0 Utilize debugging techniques in programs. – The student will be able to:		
74.01 Use the display property to enable/disable code blocks.		
74.02 Use document.write() to log program execution.	MAFS.912.A-REI.1.1	
74.03 Test program in different browsers and mobile devices for compatibility errors.	MAFS.912.S-IC.2.6	
74.04 Use comments as a flow control while debugging.	MAFS.912.N-Q.1.1	
75.0 Recognize security risks in programs. – The student will be able to:		
75.01 Describe the security risk of cookies and browsers.	MAFS.912.A-REI.1.1	
75.02 Identify security responsibilities of browsers and operating system.	MAFS.912.N-Q.1.1	
75.03 Describe security systems such as frame to frame URL changing.	MAFS.912.A-REI.1.1	
75.04 Describe the use of signed scripts.	MAFS.912.A-REI.1.1	
75.05 Create and use cookies in a secure manner.	MAFS.912.A-REI.1.1	
76.0 Use plug-ins and libraries. – The student will be able to:		
76.01 Use external libraries in the program.	MAFS.912.N-Q.1.1	
76.02 Describe and contrast the following industry libraries JQuerry, Dojo, LightBox, and Moo Tools, PhoneGap.	MAFS.912.A-REI.1.1	
76.03 Describe different types of libraries full, effects, tools, graphing, math, cryptography, and AJAX.	MAFS.912.A-REI.1.1	
76.04 Identify how load and reference external and user made scripts.	MAFS.912.N-Q.1.1	
76.05 Describe AJAX elements and procedures.	MAFS.912.A-REI.1.1	
76.06 Describe XML.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	76.07 Demonstrate the use of XMLHttpRequest to retrieve data.	MAFS.912.A-REI.1.1	
77.0	Demonstrate proficiency in programming for mobile delivery technology (e.g., iPhone/Android). – The student will be able to:		
	77.01 Respond to multi-touch and gesture events.	MAFS.912.A-REI.1.1	
	77.02 Describe and demonstrate the use of webkit CSS.	MAFS.912.A-REI.1.1	
	77.03 Use the meta tag to enable native look and feel.		
	77.04 Create a splash screen.		
	77.05 Describe and demonstrate app caching.	MAFS.912.A-REI.1.1	
	77.06 Describe and demonstrate use of JQuery for mobile development.	MAFS.912.A-REI.1.1	
	77.07 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
78.0 Demonstrate an understanding of Personal Home Page (PHP) programming language. – The student will be able to:		
78.01 Describe the evolution of PHP as a programming language.	MAFS.912.A-REI.1.1	
78.02 Discuss the strengths and limitations of PHP.		
79.0 Demonstrate proficiency in PHP configuration. – The student will be able to:		
79.01 Set up a PHP host (wamp, mamp, online).	MAFS.912.A-CED.1.1	
79.02 Configure PHP for File Transfer Protocol (FTP) access.	MAFS.912.N-Q.1.1	
79.03 Configure the config.php file.	MAFS.912.N-Q.1.1	
80.0 Demonstrate an understanding of PHP language basics. – The student will be able to:		
80.01 Describe how variables are declared, referenced, and passed.	MAFS.912.A-REI.1.1	
80.02 Describe the control structures inherent with PHP programming.	MAFS.912.A-REI.1.1	
80.03 Describe the three types of arrays used in PHP.	MAFS.912.A-REI.1.1	
80.04 Describe how functions in PHP are created, called, and controlled.	MAFS.912.A-REI.1.1	
81.0 Demonstrate proficiency in the use of server processes. – The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
81.01	Describe a session and explain its importance and use in web programming.	MAFS.912.A-REI.1.1	
81.02	Describe the server processes associated with forms handling.	MAFS.912.A-REI.1.1	
81.03	Compare and contrast the use of GET and POST.	MAFS.912.G-SRT.1.2	
81.04	Describe cookies and explain their use, population, control, and risks.	MAFS.912.A-REI.1.1	
81.05	Describe HTTP Headers and their role in web development.	MAFS.912.A-REI.1.1	
81.06	Describe HTTP Authentication.	MAFS.912.A-REI.1.1	
82.0	Demonstrate an understanding of object-oriented programming in PHP. – The student will be able to:		
82.01	Create classes using PHP.	MAFS.912.A-CED.1.1	
82.02	Describe inheritance and its role in PHP programming.	MAFS.912.A-REI.1.1	
82.03	Write PHP code to handle exceptions.	MAFS.912.A-REI.1.1	
82.04	Write PHP code to accommodate different interfaces.	MAFS.912.A-REI.1.1	
83.0	Demonstrate proficiency in writing PHP code to handle file input/output (I/O) operations. – The student will be able to:		
83.01	Write PHP code to perform open, read, and write operations on files.	MAFS.912.A-REI.1.1	
83.02	Write PHP code to initiate file system functions.	MAFS.912.A-REI.1.1	
83.03	Write PHP code to handle streams.	MAFS.912.A-REI.1.1	
84.0	Demonstrate proficiency in creating, populating, and using arrays in PHP. – The student will be able to:		
84.01	Create, populate and write code to extract information from a numeric array in PHP.	MAFS.912.A-CED.1.1	
84.02	Create, populate and write code to extract information from an associative array in PHP.	MAFS.912.A-CED.1.1	
84.03	Create, populate and write code to extract information from a multidimensional array in PHP.	MAFS.912.A-CED.1.1	
85.0	Demonstrate proficiency handling strings in PHP. – The student will be able to:		
85.01	Write PHP code to retrieve or extract one or more characters from a string.	MAFS.912.A-REI.1.1	
85.02	Write PHP code to convert a string from data type to another.	MAFS.912.A-REI.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	85.03 Write PHP code to manipulate the display characteristics of string data.	MAFS.912.A-REI.1.1	
	85.04 Write PHP code that uses string date to control program flow.	MAFS.912.A-REI.1.1	
	85.05 Write PHP code to join array elements with a string.	MAFS.912.A-REI.1.1	
86.0	Demonstrate proficiency in using PHP to access databases via Open Database Connectivity (ODBC). – The student will be able to:		
	86.01 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	
	86.02 Describe a prepared statement and discuss its primary advantages (e.g., code efficiency, SQL Injection prevention).	MAFS.912.A-REI.1.1	
	86.03 Create a prepared statement to perform specific SQL actions.	MAFS.912.A-CED.1.1	
	86.04 Describe a PHP Data Object (PDO) transaction and explain its primary advantages.	MAFS.912.A-REI.1.1	
	86.05 Create a prepared statement and associated result set using PDOStatement.	MAFS.912.A-CED.1.1	
87.0	Demonstrate proficiency in applying best practices for ensuring creation of a secure program. – The student will be able to:		
	87.01 Describe an SQL Injection, its consequences, and ways in which it may be prevented via programming.	MAFS.912.A-REI.1.1	
	87.02 Describe the Remote Code Injection vulnerability in PHP and ways in which it may be prevented.	MAFS.912.A-REI.1.1	
	87.03 Describe the risk of session hijacking in PHP and ways to program around it.	MAFS.912.A-REI.1.1	
	87.04 Describe the risks associated with uploading files in PHP and ways in which risks might be mitigated.	MAFS.912.A-REI.1.1	
	87.05 Describe Secure Sockets Layer (SSL) and usage issues related to PHP.	MAFS.912.A-REI.1.1	
88.0	Demonstrate an understanding of key technologies, protocols, and architectures associated with web development and programming. – The student will be able to:		
	88.01 SimpleXML functions.		
	88.02 Extensible Markup Language (XML) Extension.		
	88.03 XML Path Language (Xpath).		
	88.04 Web Services.		
	88.05 Simple Object Access Protocol (SOAP).		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
88.06 Representational State Transfer (REST).		
88.07 JavaScript Object Notation (JSON).		
88.08 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 & 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.

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 proficiency using the Internet to locate information.
04.0 Demonstrate an understanding of Internet safety and ethics.
05.0 Develop and apply word processing and document manipulation skills.
06.0 Develop and apply fundamental spreadsheet skills.
07.0 Demonstrate proficiency in using presentation software.
08.0 Demonstrate proficiency in using graphics software.
09.0 Demonstrate an understanding of webpage construction, operation, and function.
10.0 Demonstrate proficiency in using a GUI authoring tool to create a template-based website.
11.0 Demonstrate proficiency in fundamental computer programming and logic.
12.0 Conduct basic research using resources located on the Internet.
13.0 Demonstrate proficiency with common computer peripherals, including connections to standard input and output devices.
14.0 Demonstrate an understanding of Internet safety practices, policies, and ethics.
15.0 Demonstrate proficiency in producing moderately complex documents involving one or more office technologies.
16.0 Demonstrate proficiency in using moderately complex spreadsheet functions.
17.0 Demonstrate proficiency in communication using digital and multimedia technologies.
18.0 Demonstrate proficiency in using a web authoring tool.
19.0 Demonstrate proficiency in fundamental structured programming.
20.0 Demonstrate proficiency locating, gathering, and preparing textual, graphical, and image-based web content.
21.0 Demonstrate appropriate use of email.
22.0 Use Web 2.0 or Internet-based collaborative technology (e.g., Wikis, Wimba, Moodle, Edmodo, Facebook) to facilitate a web development or research project.
23.0 Demonstrate an understanding of computer networks.
24.0 Develop and apply database skills.
25.0 Demonstrate proficiency in embedding objects into documents and using advanced formatting options.
26.0 Demonstrate proficiency in using digital photography and digital imaging.
27.0 Demonstrate proficiency in basic video production equipment.
28.0 Demonstrate skill in using video editing software.
29.0 Demonstrate proficiency in using audio editing software (e.g., Audacity).
30.0 Demonstrate proficiency using web development tools and techniques to enhance a website's interactivity, appeal, or performance.
31.0 Demonstrate proficiency in basic programming.
32.0 Create an interactive program (i.e., a video game or interactive video) based on telling a story.

Florida Department of Education
Student Performance Standards

Course Title: **Information & Communications Technology (ICT) Essentials**
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	Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling).
01.02	Identify various computer input devices (e.g., mouse, keyboard, phone, camera) and describe their use.
01.03	Identify various computer output devices (e.g., monitor, printer, phone) and describe their use.
01.04	Identify various storage devices (e.g., flash drive, iPod, phone, external hard drive).
02.0	Demonstrate knowledge of different operating systems. – The student will be able to:
02.01	Identify the most common computer operating systems (i.e., Windows, Apple, UNIX).
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	Compare and contrast various operating systems used in mobile devices (e.g., iOS, Android).
03.0	Demonstrate proficiency using the Internet to locate information. – The student will be able to:

03.01	Identify and use web terminology.
03.02	Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).
03.03	Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).
03.04	Demonstrate proficiency using search engines, including Boolean search techniques.
03.05	Demonstrate proficiency using various web tools (e.g., downloading of files, transfer of files, telnet, PDF).
03.06	Compare and contrast the roles of web servers and web browsers.
03.07	Apply the rules for properly citing works or other information obtained from the Internet.
03.08	Identify and apply Copyright Fair Use guidelines.
03.09	Evaluate online information for credibility and quality using basic guidelines and indicators (e.g. authority, affiliation, purpose).
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	Demonstrate proficiency running an antivirus scan to remove viruses and malware.
04.04	Describe risks associated with social networking sites (e.g., FaceBook, MySpace, and Twitter) and ways to mitigate these risks.
04.05	Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.
04.06	Adhere to Acceptable Use Policies when accessing the Internet.
05.0	Develop and apply word processing and document manipulation skills. – The student will be able to:
05.01	Apply and adjust margins, tabs, line spacing and paragraph indents.
05.02	Insert and manipulate text, graphics/images, and WordArt.
05.03	Format text using the font interface and styles interface.
05.04	Adjust the size, position, and layout wrapping settings of a graphic/image.
05.05	Use the status bar to determine the number of pages, words, and characters in a document.
05.06	Insert codes for current date and time.

05.07	Copy text between documents using mouse, menu, and keyboard techniques.
05.08	Move text in a document using mouse, menu, and keyboard techniques.
05.09	Create bulleted and numbered lists.
05.10	Create a table – inserting, moving and entering data.
05.11	Create a table – format rows, columns and cells.
05.12	Insert page breaks.
05.13	Adjust magnification of document display single and multiple pages.
05.14	Understand printing options including shrink to fit, gutters, and document orientation.
05.15	Create a report or essay that contains a title page, text, a graphic/image, and WordArt.
05.16	Interpret basic proofreader marks and edit a report or essay accordingly.
06.0	Develop and apply fundamental spreadsheet skills. – The student will be able to:
06.01	Describe a spreadsheet and the ways in which it may be used.
06.02	Identify the parts of the spreadsheet display.
06.03	Insert and format text information into cells.
06.04	Insert and format numeric information into cells.
06.05	Insert and format date and time information into cells.
06.06	Select multiple cells using the mouse.
06.07	Copy information from one or more cells to another part of the spreadsheet.
06.08	Move information from one or more cells to another part of the spreadsheet.
06.09	Sum the numeric values of multiple cells.
06.10	Use the sort function to alphabetize a table of information.
06.11	Create and navigate through a worksheet.
06.12	Change column width and row height.

06.13	Insert columns and rows.
06.14	Merge cells.
06.15	Use Undo and Redo features.
06.16	Create and print a table that displays and sums the quantities or values of different categories of data.
07.0	Demonstrate proficiency in using presentation software. – The student will be able to:
07.01	Describe presentation software and the ways in which it may be used.
07.02	Create a Slide Master.
07.03	Adjust presentation format using the Slide Master.
07.04	Add and format titles, subtitles, and talking points to a presentation slide.
07.05	Insert date and time codes and slide numbers to slides.
07.06	Insert and format images/graphics onto slides.
07.07	Insert new or duplicate slides.
07.08	Adjust slide transition to include animation.
07.09	Insert and adjust sound settings and timing in presentation.
07.10	Adjust the sequence of slides in the presentation.
07.11	Produce a presentation that includes text, graphics, and digital images and present it using a projection system.
07.12	Adjust slide show set-up to loop show continuously.
08.0	Demonstrate proficiency in using graphics software. – The student will be able to:
08.01	Describe graphics software and the ways in which it may be used.
08.02	Compare and contrast vector and bitmap images.
08.03	Demonstrate knowledge of image formats related to photos and graphics on the Internet (e.g., Graphic: TIFF, BMP, EPS, Web: JPEG, GIF, PNG).
08.04	Create graphic images that demonstrate the digital use of inks, watercolors, acrylics, and oils.
08.05	Use terminology appropriate to the creation and display of graphic images.

	08.06 Create images with effects using different tools and brushes available in the software.
	08.07 Copy and paste graphic images.
	08.08 Alter the shapes and colors used in a graphic image.
	08.09 Save and export a photograph in the format that provides the best image quality and file size for Internet use.
09.0	Demonstrate an understanding of webpage construction, operation, and function. – The student will be able to:
	09.01 Categorize websites according to their purpose and domain.
	09.02 Identify elements of a webpage.
	09.03 Define basic HTML terminology.
	09.04 Critique the aesthetic and functional operation of sample websites.
10.0	Demonstrate proficiency in using a GUI authoring tool to create a template-based website. – The student will be able to:
	10.01 Create a website using an available template.
	10.02 Build the site navigation schema for a website.
	10.03 Create hyperlinks to external sites.
	10.04 Use an image or icon as a hyperlink.
	10.05 Prepare web pages for publication.
	10.06 Publish a website using File Transfer Protocol (FTP).
11.0	Demonstrate proficiency in fundamental computer programming and logic. – The student will be able to:
	11.01 Define programming and discuss its role in computing.
	11.02 Understand the binary representation of data and programs in computers.
	11.03 Define the term algorithm and its application to problem-solving.
	11.04 Describe basic Boolean concepts, including Boolean algebra, truth tables, operators, and logic.
	11.05 Describe the structure of a simple program and why sequencing is important.
	11.06 Explain the logic used for IF statements.
	11.07 Create a program using a high level programming language (e.g., Alice, DarkBASIC, GameMaker).

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	
12.0	Conduct basic research using resources located on the Internet. – The student will be able to:
12.01	Construct an effective Boolean search statement using appropriate keywords.
12.02	Evaluate search results to determine those sites or resources that best meet the research criteria.
12.03	Incorporate the results from the Internet search into a research document (e.g., report, synopsis).
12.04	Download images as needed in support of the research, complying with notices of copyright.
12.05	Properly cite the Internet sources used in the research.
13.0	Demonstrate proficiency with common computer peripherals, including connections to standard input and output devices. – The student will be able to:
13.01	Identify the types and purposes of common input devices (e.g., mouse, keyboard, camera, microphone, scanner).
13.02	Identify the types and purposes of specialized input devices (e.g., digital cameras, mobile devices, GPS devices).
13.03	Describe the types and purposes of various computer connection ports (e.g., USB, firewire, parallel, serial, Ethernet).
13.04	Connect an input device (e.g., mouse, keyboard, cell phone, camera) and verify proper operation.
13.05	Connect an output device (e.g., printer, monitor, projector) and verify proper operation.

CTE Standards and Benchmarks	
14.0	Demonstrate an understanding of Internet safety practices, policies and ethics. – The student will be able to:
14.01	Describe cyber-bullying and its impact on perpetrators and victims.
14.02	Differentiate between viruses and malware, specifically their sources, ploys and impact on personal privacy and computer operation, and ways to avoid infection.
14.03	Describe risks associated with sexting, including related legal issues, social engineering aspects, prevention methods and reporting of offenses.
14.04	Describe the risks associated with online gaming and ways to mitigate these risks.
14.05	Describe the ethics and copyright legalities of downloading music or videos from the Internet.
14.06	Describe risks associated with social networking sites (e.g., FaceBook, MySpace, Twitter) and ways to mitigate these risks.
14.07	Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms and other social network websites.
15.0	Demonstrate proficiency in producing moderately complex documents involving one or more office technologies. – The student will be able to:
15.01	Create a word processed document (e.g., article, newsletter) that employs a column layout.
15.02	Create a word processed document that includes an imbedded image formatted to wrap text tightly around the image.
15.03	Create a word processed document that integrates objects from a spreadsheet.
15.04	Create a word processed document that includes formatted shapes and WordArt.
15.05	Convert a body of text into a multi-column table, sorted by the left-most column.
15.06	Format a word processed document using styles and the Document Map.
15.07	Use numbered and bulleted lists in a document.
15.08	Create a word processed document that uses multi-level outlining.
15.09	Adjust the formatting of a multi-level outline document.
16.0	Demonstrate proficiency in using moderately complex spreadsheet functions. – The student will be able to:
16.01	Insert arithmetic formulas into a spreadsheet.
16.02	Differentiate between absolute and relative cell addressing.

CTE Standards and Benchmarks	
16.03	Apply and adjust cell formatting to accommodate currency, date and percentage values.
16.04	Apply shading and borders to a spreadsheet.
16.05	Demonstrate how to use common spreadsheet functions (e.g., SUM, AVERAGE, COUNT).
16.06	Use Conditional Formatting to highlight text.
16.07	Create a chart based on data sets defined in a spreadsheet.
16.08	Adjust chart types to appropriately represent base data.
17.0	Demonstrate proficiency in communication using digital and multimedia technologies. – The student will be able to:
17.01	Create a progressive slide presentation featuring the use of SmartArt and animated transitions.
17.02	Use a portable digital video device (e.g., cell phone, Flip camera) to produce video clips for transfer onto a computer.
17.03	Use video editing software to produce a slide show or video movie.
17.04	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.
18.0	Demonstrate proficiency in using a web authoring tool. – The student will be able to:
18.01	Build, optimize, edit, and test web pages for publication.
18.02	Demonstrate an understanding of network and web implementation issues (e.g., bandwidth, compression, streaming).
18.03	Compare and contrast various methods by which information may be accessed on the Internet/Intranet (e.g., FTP, telnet, browser).
18.04	Demonstrate an understanding of file encryption methods (e.g., secure server, unsecured server).
18.05	Modify a webpage template to achieve an effective look and feel for a website.
18.06	Integrate video and animation files into a webpage.
18.07	Prepare web pages for publication.
18.08	Publish a website.
19.0	Demonstrate proficiency in fundamental structured programming. – The student will be able to:
19.01	Describe structured programming and discuss the advantages of this approach.

CTE Standards and Benchmarks	
19.02	Describe and give examples of the three structural components (i.e., decisions, sequences, loops) used in structured programming.
19.03	Write a program in pseudo code that uses structured programming to solve a problem.
19.04	Convert a program from pseudo code into a common high level programming language (e.g., Alice, DarkBASIC).

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	
20.0	Demonstrate proficiency locating, gathering, and preparing textual, graphical, and image-based web content. – The student will be able to:
20.01	Characterize effective writing styles and conventions for the web.
20.02	Use word processing software to create effective written content for the web.
20.03	Use graphics software to create message-driven 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	Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.
21.0	Demonstrate appropriate use of email. – The student will be able to:
21.01	Describe email capabilities and functions.
21.02	Identify components of an email message.
21.03	Identify the components of an email address.
21.04	Attach a file to an email message.

CTE Standards and Benchmarks	
	21.05 Forward an email message to one or more addressees.
	21.06 Use an address book.
	21.07 Reply to an email message.
	21.08 Use the Internet to perform email activities (i.e., web-based email).
	21.09 Identify the appropriate use of email and demonstrate related email etiquette.
22.0	Use Web 2.0 or Internet-based collaborative technology (e.g., Wikis, Wimba, Moodle, Edmodo, Facebook) to facilitate a web development or research project. – The student will be able to:
	22.01 Create and use a wiki or similar collaborative environment for communicating and sharing among project team members.
	22.02 Create and use a social media page (e.g., Facebook, Wimba, Moodle) to share and publish project components (e.g., content, images, graphics, videos) for gauging visitor reaction and obtaining feedback.
23.0	Demonstrate an understanding of computer networks. – The student will be able to:
	23.01 Define networking and describe the purpose of a network.
	23.02 Describe the conceptual background of digital networks including terminology and basics.
	23.03 Describe various types of networks and the advantages and disadvantages of each (e.g. peer to peer, client/server, mainframe/terminal).
	23.04 Describe the function of various network devices (e.g. hub, switched hub or switch, Router Bridge, gateway, access points).
	23.05 Describe how network devices are identified (i.e., IP addressing).
	23.06 Explain the protocols commonly used in a network environment.
	23.07 Describe the purpose of the OSI model and each of its layers.
	23.08 Understand how two network nodes communicate through the OSI model.
	23.09 Differentiate between public and private IP addresses.
	23.10 Describe the difference between the Internet and intranet.
	23.11 Compare and contrast the different methods for network connectivity (e.g. broadband, wireless, Bluetooth, cellular).
	23.12 Discuss the differences between Local Area Network (LAN), Wide Area Network (WAN), Metropolitan Area Network (MAN), and Virtual Private Network (VPN).

CTE Standards and Benchmarks	
24.0	Develop and apply database skills. – The student will be able to:
24.01	Define database.
24.02	Differentiate between fields and records in a database.
24.03	Describe the various data types used in a database.
24.04	Create a data table that uses multiple data types.
24.05	Add, edit, sort, and delete records in datasheet view.
24.06	Differentiate between a table and a query.
24.07	Describe Structured Query Language (SQL) and discuss its use with databases.
24.08	Create a basic SELECT query.
24.09	Export data from a database into a spreadsheet form.
24.10	Import data from a spreadsheet.
24.11	Create meaningful reports from the database.
25.0	Demonstrate proficiency in embedding objects into documents and using advanced formatting options. – The student will be able to:
25.01	Embed a PDF file (e.g., a map, image) into a word processed document and format to wrap text around the object.
25.02	Enhance the appearance of WordArt using the shape, spacing, shadow, and 3D effects formatting features.
25.03	Create a word processed document that includes SmartArt.
25.04	Convert a document from profile to landscape orientation and adjust margins and headers and footers.
25.05	Insert citations and a bibliography into a word processed document.
25.06	Create an automatic Table of Contents.
25.07	Add comments to a document.
25.08	Revise a word processed document with Track Changes enabled, then accept and reject changes as appropriate.

CTE Standards and Benchmarks	
	25.09 Using the Translate feature, translate a document from English to another language and vice versa.
26.0	Demonstrate proficiency in using digital photography and digital imaging. – The student will be able to:
	26.01 Demonstrate knowledge of ethics related to digital imaging and legal consent issues.
	26.02 Apply effective design principles in digital photography compositions.
	26.03 Demonstrate skill in using digital imaging software for image manipulation, color correction, and special effects to creatively convey a message or literary interpretation.
	26.04 Demonstrate skill in scanning and cropping photographs.
27.0	Demonstrate proficiency in basic video production equipment. – The student will be able to:
	27.01 Operate video camera (e.g., Flip camera, cell phone).
	27.02 Write storyboards to depict a one minute video segment.
	27.03 Determine appropriate lighting needs.
	27.04 Create video shots sufficient to produce a one minute video.
28.0	Demonstrate skill in using video editing software. – The student will be able to:
	28.01 Demonstrate knowledge of the digital video software interface.
	28.02 Demonstrate ability to edit, cut, erase, and insert video.
	28.03 Edit video as needed to achieve desired message and length.
	28.04 Describe a first complete run-through of the video production process.
	28.05 Characterize the qualities of effective communication in a completed video.
	28.06 Prepare a one minute video project for final compositing and export.
	28.07 Upload finished video files to a website.
29.0	Demonstrate proficiency in using audio editing software (e.g., Audacity). – The student will be able to:
	29.01 Demonstrate knowledge of the audio editing software interface.

CTE Standards and Benchmarks	
	29.02 Demonstrate ability to edit, cut, erase, and insert audio.
	29.03 Edit audio as needed to achieve desired message and length.
	29.04 Prepare a one minute audio commercial project.
30.0	Demonstrate proficiency using web development tools and techniques to enhance a website's interactivity, appeal, or performance. – The student will be able to:
	30.01 Compare and contrast writing HTML using a text editor versus using a Graphical User Interface (GUI) editor.
	30.02 Design and create an effective web page template.
	30.03 Demonstrate knowledge of color wheel and proper use of color.
	30.04 Create attractive, engaging, and efficient web pages using a GUI editor.
	30.05 Insert audio files into a Web page.
	30.06 Create, edit and integrate video files into a webpage.
	30.07 Create, edit and integrate animation files into a webpage.
	30.08 Use Dynamic HTML (DHTML) to enhance webpage interactivity.
	30.09 Create webpages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
31.0	Demonstrate proficiency in basic programming. – The student will be able to:
	31.01 Describe iterative programming structures (e.g., while, do/while) and how they are used in programming.
	31.02 Explain the types and uses of variables in programming.
	31.03 Describe object-oriented concepts.
	31.04 Compare and contrast programming languages that are compiled (e.g., C++), interpreted (e.g., HTML), and translated (e.g., Java).
	31.05 Create animated objects using a high level programming language to control their behavior.
	31.06 Write a program design document showing program flow using pseudo code.
	31.07 Create a program using animated objects.

CTE Standards and Benchmarks	
	31.08 Troubleshoot and debug errors in code.
32.0	Create an interactive program (i.e., a video game or interactive video) based on telling a story. – The student will be able to:
	32.01 Apply the design process in solving a problem.
	32.02 Identify the design criteria and constraints.
	32.03 Create storyboards to model the program flow and functionality.
	32.04 Write the appropriate code.
	32.05 Test and evaluate the program.
	32.06 Modify the program as needed to solve the problem.

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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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.

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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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.

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.
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.
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.

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/.

Career and Technical Student Organization (CTSO)

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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:
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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.

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.

CTE Standards and Benchmarks	
	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.
	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.

CTE Standards and Benchmarks	
	09.04 Explain specific functions belonging to each OSI model layer.
	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.

CTE Standards and Benchmarks	
12.02	Describe the Entity Relationship Model (ERM).
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.

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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 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.

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.
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	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.

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: **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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Design a computer program to meet specific physical, operational, and interaction criteria.
27.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
28.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
29.0 Create a unit test plan, implement the plan, and report the results of testing.
30.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
31.0 Solve problems using critical thinking skills, creativity and innovation.
32.0 Use information technology tools.
33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.

34.0 Describe the importance of professional ethics and legal responsibilities.
35.0 Participate in work-based learning experiences.
36.0 Identify functions of information processing.
37.0 Identify functions of computers.
38.0 Test programs.
39.0 Plan program design.
40.0 Code programs.
41.0 Perform program maintenance.
42.0 Evaluate assigned business computer programming tasks.
43.0 Develop an awareness of software quality assurance.
44.0 Implement enhanced program structures.
45.0 Develop an understanding of programming techniques and concepts.
46.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
47.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
48.0 Explain the importance of employability skill and entrepreneurship skills.
49.0 Test programs.
50.0 Plan program design.
51.0 Code programs.
52.0 Perform program maintenance.
53.0 Create and maintain documentation.
54.0 Evaluate assigned business computer programming tasks.
55.0 Demonstrate an understanding of operating systems, environments, and platforms.
56.0 Develop an awareness of software quality assurance.
57.0 Implement enhanced program structures.
58.0 Develop an understanding of programming techniques and concepts.
59.0 Test programs.
60.0 Plan program design.
61.0 Code programs.
62.0 Perform program maintenance.
63.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

	12.09 Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
	13.01 Identify elements of a Web page.
	13.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
	13.03 Define basic HTML terminology.
	13.04 Analyze HTML source code developed by others.
	13.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
	13.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
	13.07 Edit and test HTML documents for accuracy and validity.
	13.08 Use basic functions of WYSIWYG editors.
	13.09 Use basic functions of HTML, DHTML, and XML editors and converters.
	13.10 Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
	14.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
	14.02 Describe and apply color theory as it applies to Web page design (e.g., background, text color).
	14.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	14.04 Use image design software to create and edit images.
	14.05 Demonstrate proficiency in publishing to the Internet.
	14.06 Demonstrate proficiency in adding downloadable forms to web pages.
	14.07 Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
	15.01 Compare and contrast various methods of evaluation for emerging technologies.
	15.02 Demonstrate knowledge of the process of planning upgrades and changeovers.
	15.03 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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
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.
18.02	Identify tasks performed by programmers.
18.03	Describe how businesses use computer programming to solve business problems.
18.04	Investigate job opportunities in the programming field.
18.05	Explain different specializations and the related training in the computer programming field.
18.06	Explain the need for continuing education and training of computer programmers.
18.07	Explain enterprise software systems and how they impact business.
18.08	Describe ethical responsibilities of computer programmers.
18.09	Describe the role of customer support to software program quality.
18.10	Identify credentials and certifications that may improve employability for a computer programmer.
18.11	Identify devices, tools, and other environments for which programmers may develop software.
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.
19.02	Explain the types and uses of variables in programs.
19.03	Determine the best data type to use for given programming problems.
19.04	Identify the types of operations that can be performed on different data types.
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.
19.06	Explain how computers store different data types in memory.
19.07	Demonstrate the difference between "data" and "information."
19.08	Use different number systems to represent data.
19.09	Explain how national and international standards (*i.e.*, ASCII, UNICODE) are used to represent non-numerical data.

	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.
	20.02 Explain iterative programming structures (*e.g.*, while, do/while) and their uses.
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.
	21.02 Identify the characteristics, uses, and limits of high-level programming languages.
	21.03 Identify the characteristics, uses, and limits of rapid development programming languages.
	21.04 Describe object-oriented concepts.
	21.05 Explain the characteristics of procedural and object-oriented programming languages.
	21.06 Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).
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.
	22.02 Describe the stages of the program life cycle.
	22.03 Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).
	22.04 List and explain the steps in the program development cycle.
	22.05 Describe different types of documentation used in the program development cycle (*e.g.*, requirements document, program design documents, test plans).
	22.06 Describe the on-going need for program maintenance.
	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).
	22.08 Describe different methods used to facilitate version control and change management.
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.
	23.02 Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).

	23.03	Describe data and the use of test plans/scripts to be used in program testing.
	23.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).
	23.05	Identify the data to be used for boundary conditions.
	23.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.
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, rapid application development).
	24.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).
	24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.
	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).
	24.05	Write a program design document using UML or other standard design methodology.
	24.06	Define input and output for a program module using UML or other standard design methodology.
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.
	25.02	Identify different types of threats to computer systems.
	25.03	Identify methods to protect against different threats to computer systems.
	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).
26.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:	
	26.01	Choose appropriate data types depending on the needs of the program.
	26.02	Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).
	26.03	Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).
	26.04	Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).
	26.05	Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).

27.0	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:
27.01	Use appropriate naming conventions to define program variables and modules (methods, functions).
27.02	Use a program editor to write the source code for a program.
27.03	Write programs that use selection structures (*e.g.*, if, if/else).
27.04	Write programs that use repetition structures (*e.g.*, while, do/while).
27.05	Write programs that use nested structures.
27.06	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.
27.07	Compile and run programs.
27.08	Write programs that use standard arithmetic operators with different numerical data types.
27.09	Write programs that use standard logic operators.
27.10	Write programs that use a variety of common data types.
27.11	Write programs that perform data conversion between standard data types.
27.12	Write programs that define, use, search, and sort arrays.
27.13	Write programs that use user-defined data types.
27.14	Demonstrate understanding and use of appropriate variable scope.
28.0	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:
28.01	Write programs that perform user input and output.
28.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).
28.03	Write program modules such as functions, subroutines, or methods.
28.04	Write program modules that accept arguments.
28.05	Write program modules that return values.
28.06	Write program modules that validate arguments and return error codes.
28.07	Write interactive programs.

	28.08 Write programs that use standard libraries to enhance program function.
	28.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
29.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	29.01 Write a unit test plan that identifies the input data and expected results for program tests.
	29.02 Test and debug programs, including programs written by others.
	29.03 Write a test report that identifies the results of testing.
	29.04 Trace through the function of a program to ensure valid operation.
	29.05 Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).
	29.06 Create a disaster/emergency response plan for a computer system.
30.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	30.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	30.02 Locate, organize and reference written information from various sources.
	30.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	30.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	30.05 Apply active listening skills to obtain and clarify information.
	30.06 Develop and interpret tables and charts to support written and oral communications.
	30.07 Exhibit public relations skills that aid in achieving customer satisfaction.
31.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	31.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	31.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	31.03 Identify and document workplace performance goals and monitor progress toward those goals.
	31.04 Conduct technical research to gather information necessary for decision-making.
32.0	Use information technology tools. – The student will be able to:
	32.01 Use personal information management (PIM) applications to increase workplace efficiency.

	32.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	32.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	32.04 Employ collaborative/groupware applications to facilitate group work.
33.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	33.01 Employ leadership skills to accomplish organizational goals and objectives.
	33.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	33.03 Conduct and participate in meetings to accomplish work tasks.
34.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	34.01 Evaluate and justify decisions based on ethical reasoning.
	34.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	34.03 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**	
35.0	Participate in work-based learning experiences. – The student will be able to:
	35.01 Participate in work-based learning experiences in a computer programming environment.
	35.02 Compare and contrast programming languages used in a computer programming environment.
	35.03 Discuss the management/supervisory skills needed in a computer programming environment.
36.0	Identify functions of information processing. – The student will be able to:
	36.01 Identify the advantages and disadvantages of blocking and buffering when accessing data on tape and disk storage.
	36.02 Choose appropriate storage of numeric values to insure precision needed for calculations (e.g., integer, fixed-point, floating-point).
37.0	Identify functions of computers. – The student will be able to:
	37.01 Identify the advantages and disadvantages of virtual memory.
38.0	Test programs. – The student will be able to:
	38.01 Develop a plan for system integration testing.
39.0	Plan program design. – The student will be able to:
	39.01 Plan interfaces for systems integration.
40.0	Code programs. – The student will be able to:
	40.01 Access external files in a client/server environment.
41.0	Perform program maintenance. – The student will be able to:
	41.01 Modify or create new programs for vendor supplied applications.
	41.02 Use a computer system with current commercial-end application software to solve problems within an organizational environment.
42.0	Evaluate assigned business computer programming tasks. – The student will be able to:
	42.01 Utilize and apply project and time management tools to control systems development.
	42.02 Analyze computer resources necessary to run a program.
43.0	Develop an awareness of software quality assurance. – The student will be able to:

	43.01 Evaluate performance, functionality, and validity of various software packages.
44.0	Implement enhanced program structures. – The student will be able to:
	44.01 Write programs to import/export data from external sources.
	44.02 Write routines that incorporate “help” text.
	44.03 Write interactive programs.
	44.04 Design screen layouts for use in interactive programs.
45.0	Develop an understanding of programming techniques and concepts. – The student will be able to:
	45.01 Identify object-oriented concepts and provide examples of objects in an object-oriented language.
	45.02 Describe development methodologies, programming and system languages, database technologies, and data communication.
46.0	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:
	46.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	46.02 Explain emergency procedures to follow in response to workplace accidents.
	46.03 Create a disaster and/or emergency response plan.
47.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	47.01 Employ leadership skills to accomplish organizational goals and objectives.
	47.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	47.03 Conduct and participate in meetings to accomplish work tasks.
	47.04 Employ mentoring skills to inspire and teach others.
48.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	48.01 Identify and demonstrate positive work behaviors needed to be employable.
	48.02 Develop personal career plan that includes goals, objectives, and strategies.
	48.03 Examine licensing, certification, and industry credentialing requirements.
	48.04 Maintain a career portfolio to document knowledge, skills, and experience.
	48.05 Evaluate and compare employment opportunities that match career goals.

48.06	Identify and exhibit traits for retaining employment.
48.07	Identify opportunities and research requirements for career advancement.
48.08	Research the benefits of ongoing professional development.
48.09	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**
49.0 Test programs. – The student will be able to:
49.01 Develop a plan for testing programs.
49.02 Develop a plan for system integration testing.
49.03 Develop data for use in program testing.
49.04 Perform debugging activities.
49.05 Distinguish among the different types of program and design errors.
49.06 Evaluate program test results.
49.07 Execute programs and subroutines as they relate to the total application.
49.08 Use trace routines of compilers to assist in program debugging.
49.09 Compile and run programs.
50.0 Plan program design. – The student will be able to:
50.01 Formulate a plan to determine program specifications individually or in groups.
50.02 Use a graphical representation or pseudo code to represent the structure in a program or subroutine.
50.03 Design programs to solve problems using problem-solving strategies.
50.04 Prepare proper input/output layout specifications.
50.05 Examine existing utility programs and subroutines for use with other programs.
50.06 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
51.0 Code programs. – The student will be able to:
51.01 Utilize reference manuals.
51.02 Write programs according to recognized programming standards.
51.03 Write internal documentation statements as needed in the program source code.
51.04 Code programs in high-level languages for business applications.

	51.05 Write code that accesses sequential, indexed sequential, random, and direct files.
	51.06 Code programs using logical statements (e.g., If-Then-Else, Do...While).
	51.07 Enter and modify source code using a program language editor.
	51.08 Code routines within programs that validate input data.
	51.09 Use the rounding function in calculations within programs.
52.0	Perform program maintenance. –The student will be able to:
	52.01 Review requested modification of programs and establish a plan of action.
	52.02 Design needed modifications in conformance with established standards.
	52.03 Code, test, and debug modifications prior to updating production code.
	52.04 Update production programs and documentation with changes.
	52.05 Analyze output to identify and annotate errors or enhancements.
	52.06 Modify or create new programs for vendor supplied applications.
	52.07 Use a computer system with current commercial-end application software to solve problems within an organizational environment.
53.0	Create and maintain documentation. – The student will be able to:
	53.01 Write documentation to assist operators and end-users.
	53.02 Follow established documentation standards.
	53.03 Update existing documentation to reflect program changes.
54.0	Evaluate assigned business computer programming tasks–The student will be able to:
	54.01 Utilize and apply project and time management tools to control systems development.
	54.02 Analyze computer resources necessary to run a program.
55.0	Demonstrate an understanding of operating systems, environments, and platforms. – The student will be able to:
	55.01 Assess and analyze the functions of different operating systems.
	55.02 Assess and analyze the program development and execution utilities of relevant operating systems.
56.0	Develop an awareness of software quality assurance. – The student will be able to:

	56.01 Evaluate performance, functionality, and validity of various software packages.
57.0	Implement enhanced program structures. – The student will be able to:
	57.01 Write programs that incorporate multi-level subtotals and page breaks.
	57.02 Write programs that include tables or arrays and routines for data entry and lookup.
	57.03 Write routines to sort arrays.
	57.04 Write programs that sort records in files.
	57.05 Write programs to create and maintain a master file.
	57.06 Write programs to process transactions.
	57.07 Write programs to import/export/convert data from external sources.
	57.08 Write programs that use iteration.
	57.09 Write routines that incorporate “help” text.
	57.10 Write programs that read and write sequential files.
	57.11 Write programs that read and write indexed-sequential files.
	57.12 Write programs that read and write random files.
	57.13 Write interactive programs.
	57.14 Design screen layouts for use in interactive programs.
	57.15 Write programs using object-oriented languages.
58.0	Develop an understanding of programming techniques and concepts. – The student will be able to:
	58.01 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**
59.0 Test programs. – The student will be able to:
59.01 Develop a plan for testing programs.
59.02 Develop a plan for system integration testing.
59.03 Develop data for use in program testing.
59.04 Perform debugging activities.
59.05 Distinguish among the different types of program and design errors.
59.06 Evaluate program test results.
59.07 Execute programs and subroutines as they relate to the total application.
59.08 Use trace routines of compilers to assist in program debugging.
60.0 Plan program design. – The student will be able to:
60.01 Formulate a plan to determine program specifications individually or in groups.
60.02 Use a graphical representation or pseudo code to represent the structure in a program or subroutine.
60.03 Design programs to solve problems using problem-solving strategies.
60.04 Prepare proper input/output layout specifications.
60.05 Examine existing utility programs and subroutines for use with other programs.
60.06 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
61.0 Code programs. – The student will be able to:
61.01 Utilize reference manuals.
61.02 Write programs according to recognized programming standards.
61.03 Write internal documentation statements as needed in the program source code.
61.04 Code programs in high-level languages for business applications.
61.05 Write code that accesses sequential, indexed sequential, random, and direct files.

61.06	Code programs using logical statements (e.g., If-Then-Else, Do-While).
61.07	Enter and modify source code using a program language editor.
61.08	Code routines within programs that validate input data.
61.09	Use the rounding function in calculations within programs.
62.0	Perform program maintenance. – The student will be able to:
62.01	Review requested modification of programs and establish a plan of action.
62.02	Design needed modifications in conformance with established standards.
62.03	Code, test, and debug modifications prior to updating production code.
62.04	Update production programs and documentation with changes.
62.05	Analyze output to identify and annotate errors or enhancements.
63.0	Implement enhanced program structures. – The student will be able to:
63.01	Write programs that include tables or arrays and routines for data entry and lookup.
63.02	Write programs that use iteration.
63.03	Write routines that incorporate “help” text.
63.04	Write programs that read and write sequential files.
63.05	Write programs that read and write indexed-sequential files.
63.06	Write programs that read and write random files.
63.07	Write interactive programs.
63.08	Design screen layouts for use in interactive programs.
63.09	Write programs using object-oriented languages.
63.10	Write programs that include data structures (e.g., stacks, queues, trees, linked lists).
63.11	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 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 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

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 Demonstrate comprehension and communication skills.
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
30.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
31.0 Understand, describe, and explain internet connections.
32.0 Define networking terminology.
33.0 Explain how to connect copper media, optical media, and wireless media.
34.0 Perform tasks related to the network cable testing and cable making.
35.0 Define network topologies, devices and connections.
36.0 Define Ethernet fundamentals and operations.
37.0 Define and explain the functions of bridges and switches.
38.0 Explain the mathematical concepts and protocols behind the internet.
39.0 Define and explain the difference between routed and routing protocols.
40.0 Recognize, define, and explain functions of the transport layer.
41.0 Explain, define, and identify the components of a WAN and router.
42.0 Describe and identify an operating system for a router.
43.0 Explain how to establish connections between neighboring routers.
44.0 Identify and explain the router boot sequence and file system.
45.0 Identify and explain static and dynamic routing protocols.
46.0 Describe and configure distance vector protocols.
47.0 Perform tasks related to protocol troubleshooting.
48.0 Examine and test networks.
49.0 Define, explain and describe access lists.
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, interorganizational systems, and the larger environment.
54.0 Describe the importance of professional ethics and legal responsibilities.
55.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
56.0 Participate in work-based learning experiences.
57.0 Provide network support and assistance by troubleshooting and diagnosing through direct contact remote access.
58.0 Develop electronic communications skills.
59.0 Perform logical and physical network design activities.
60.0 Demonstrate proficiency in selecting appropriate various routing protocols and IP routing configuration for various network designs.
61.0 Demonstrate proficiency in using network traffic filtering to improve network performance and provide basic levels of security.
62.0 Perform network management activities related to documentation, security, performance, administration, troubleshooting and coping with environmental factors.
63.0 Identify and describe various WAN functions, devices, and demonstrate understanding of the WAN design process.
64.0 Describe the operation and implementation of virtual private networks.

65.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
66.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
67.0 Explain the importance of employability skill and entrepreneurship skills.
68.0 Participate in work-based learning experiences.
69.0 Compare and contrast hierarchical network design models and scalable internetworks.
70.0 Discuss advanced IP addressing management.
71.0 Demonstrate proficiency in basic router configuration.
72.0 Demonstrate proficiency in the use of OSPF.
73.0 Understand and discuss multi-area OSPF operation and configuration.
74.0 Demonstrate the use of stub and totally stubby areas.
75.0 Configure and define virtual links.
76.0 Demonstrate proficiency in the use of EIGRP.
77.0 Demonstrate proficiency in route optimization.
78.0 Demonstrate proficiency in the use of BGP.
79.0 Define and show proficiency in security.
80.0 Use lab equipment, demonstrate the setup, configuration, connectivity of routers to create a small WAN.
81.0 Show the process of using modems and asynchronous dialup connections.
82.0 Configure and verify PPP configurations.
83.0 Configure and monitor ISDN and DDR.
84.0 Configure dialer profiles.
85.0 Create and troubleshoot X.25 configurations.
86.0 Configure and troubleshoot frame relay.
87.0 Demonstrate the use of WAN backup and dial backup.
88.0 Demonstrate the use of queuing and compression techniques.
89.0 Demonstrate the use of scaling IP addresses with NAT.
90.0 Demonstrate proficiency using AAA to scale access control.
91.0 Discuss and explain emerging remote-access technologies.
92.0 Demonstrate proficiency configuring a 700 series router.
93.0 Understand and describe key characteristics of various switching technologies, LAN switching and the hierarchical model of network design, and the building-block approach.
94.0 Understand and describe campus networks, design models, and switching technologies.
95.0 List and describe various types of LAN media.
96.0 Show proficiency configuring a switch.
97.0 Demonstrate proficiency configuring VLANS.
98.0 Understand and explain spanning tree protocol (STP) AND redundant links.
99.0 Demonstrate proficiency routing between VLANS.
100.0 Demonstrate proficiency with multilayer switching.
101.0 Demonstrate the use of hot standby routing protocol (HSRP).
102.0 Understand and use IGMP and multicasting.
103.0 Demonstrate proficiency restricting network access.
104.0 Demonstrate proficiency using network troubleshooting tools and basic network management diagnostic tools.

105.0 List and define the commonly used protocols, routing techniques, and switching processes
106.0 Demonstrate proficiency troubleshooting TCP/IP, LAN switch environment, VLANS, frame relay, and ISDN.
107.0 Demonstrate proficiency configuring and trouble-shooting IPX and APPLETALK.
108.0 Demonstrate proficiency troubleshooting EIGRP, OSPF, and BGP.
109.0 Participate in work-based learning experiences.
110.0 Demonstrate proficiency in applying radio frequency (RF) technologies.
111.0 Develop an awareness of wireless LAN technologies.
112.0 Perform implementation and management activities.
113.0 Develop an awareness of wireless security systems.
114.0 Demonstrate knowledge of wireless industry standards.
115.0 Participate in work-based learning experiences.
116.0 Demonstrate knowledge of general security concepts.
117.0 Develop an awareness of communication security concepts.
118.0 Develop an awareness of network infrastructure security.
119.0 Develop an awareness of cryptography and its relation to security.
120.0 Incorporate organizational and operational security in an appropriate and effective manner.

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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

12.09	Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
13.01	Identify elements of a Web page.
13.02	Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
13.03	Define basic HTML terminology.
13.04	Analyze HTML source code developed by others.
13.05	Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
13.06	Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
13.07	Edit and test HTML documents for accuracy and validity.
13.08	Use basic functions of WYSIWYG editors.
13.09	Use basic functions of HTML, DHTML, and XML editors and converters.
13.10	Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
14.01	Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
14.02	Describe and apply color theory as it applies to Web page design (e.g., background and text color).
14.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
14.04	Use image design software to create and edit images.
14.05	Demonstrate proficiency in publishing to the Internet.
14.06	Demonstrate proficiency in adding downloadable forms to web pages.
14.07	Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
15.01	Compare and contrast various methods of evaluation for emerging technologies.
15.02	Demonstrate knowledge of the process of planning upgrades and changeovers.
15.03	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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).

Course Number: EEV0504 **Occupational Completion Point: B** **Computer Support Assistant – 150 Hours – SOC Code 15-1151**	
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 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.
	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).
	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 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 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.
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 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.

Course Number: CTS0022 **Occupational Completion Point: C** **Network Support Help Desk Assistant – 150 Hours – SOC Code 15-1142**	
29.0	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:
29.01	Develop diplomatic methods to communicate with customers.
30.0	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:
30.01	Apply first response assistance for minor repair work.
31.0	Understand, describe, and explain internet connections. – The student will be able to:
31.01	Understand the physical connectivity necessary for a computer to connect to the Internet.
31.02	Recognize the primary components of a computer.
31.03	Install and troubleshoot network interface cards and/or modems.
31.04	Use basic testing procedures to test the Internet connection.
31.05	Demonstrate a basic understanding of the use of Web browsers and plug-ins.
32.0	Define networking terminology. – The student will be able to:
32.01	Explain the importance of bandwidth in networking.
32.02	Identify bps, kbps, Mbps, and Gbps as units of bandwidth.
32.03	Explain the difference between bandwidth and throughput.
32.04	Explain the development of the Open System Interconnection model (OSI).
32.05	List the advantages of a layered approach.
32.06	Identify each of the seven layers of the OSI model.
32.07	Identify the four layers of the TCP/IP model.
32.08	Describe the similarities and differences between the two models.
32.09	Briefly outline the history of networking.
32.10	Identify devices used in networking.

	32.11 Understand the role of protocols in networking.
	32.12 Define LAN, WAN, MAN, and SAN.
	32.13 Explain VPNs and their advantages.
	32.14 Describe the differences between intranets and extranets.
33.0	Explain how to connect copper media, optical media, and wireless media. – The student will be able to:
	33.01 Discuss the electrical properties of matter.
	33.02 Define voltage, resistance, impedance, current, and circuits.
	33.03 Describe the specifications and performances of different types of cable.
	33.04 Describe coaxial cable and its advantages and disadvantages over other types of cable.
	33.05 Describe shielded twisted-pair (STP) cable and unshielded twisted-pair cable and its uses.
	33.06 Describe (UTP) and their uses.
	33.07 Discuss the characteristics of straight-through, crossover, and rollover cables and where each is used.
	33.08 Explain the basics of fiber-optic cable.
	33.09 Describe how fibers can guide light for long distances.
	33.10 Describe multimode and single-mode fiber.
	33.11 Describe how fiber is installed.
	33.12 Describe the type of connectors and equipment used with fiber-optic cable.
	33.13 Explain how fiber is tested to ensure that it will function properly.
	33.14 Discuss safety issues dealing with fiber-optics.
34.0	Perform tasks related to the network cable testing and cable making. – The student will be able to:
	34.01 Differentiate between sine waves and square waves.
	34.02 Define and calculate exponents and logarithms.
	34.03 Define and calculate decibels.
	34.04 Define basic terminology related to time, frequency, a noise.

34.05	Differentiate between digital bandwidth and analog bandwidth.
34.06	Compare and contrast noise levels on various types of cabling.
34.07	Define and describe the effects of attenuation and impedance mismatch.
34.08	Define crosstalk, near-end crosstalk, far-end crosstalk, and power sum near-end crosstalk.
34.09	Describe how crosstalk and twisted pairs help reduce noise.
34.10	Describe the ten copper cable tests defined in TIA/EIA-568-B.
34.11	Describe the difference between Category 5 and Category 6 cable.
35.0	Define network topologies, devices and connections. – The student will be able to perform tasks related to the following:
35.01	Identify characteristics of Ethernet networks.
35.02	Identify straight-through, crossover, and rollover cable.
35.03	Describe the function, advantages, and disadvantages of repeaters, hubs, bridges, switches, and wireless network components.
35.04	Describe the function of peer-to-peer networks.
35.05	Describe the function, advantages, and disadvantages of client-server networks.
35.06	Describe and differentiate between serial, Integrated Services Digital Network (ISDN), digital subscriber line (DSL), and cable modem WAN connections.
35.07	Identify router serial ports and their cable and connectors.
35.08	Identify and describe the placement of equipment used in various WAN configurations.
36.0	Define Ethernet fundamentals and operations. – The student will be able to:
36.01	Describe the basics of Ethernet technology.
36.02	Explain naming rules of Ethernet technology.
36.03	Define how Ethernet and the OSI model interact.
36.04	Describe the Ethernet framing process and frame structure.
36.05	List Ethernet frame field names and purposes.
36.06	Identify the characteristics of CSMA/CD.
36.07	Describe the key aspects of Ethernet timing, interframe spacing and backoff time after a collision.

	36.08 Define Ethernet errors and collisions.
	36.09 Explain the concept of auto-negotiation in relation to speed and duplex.
37.0	Define and explain the functions of bridges and switches. – The student will be able to:
	37.01 Define bridging and switching.
	37.02 Define and describe the content-addressable memory (CAM) table.
	37.03 Define latency.
	37.04 Describe store-and forward and cut-through switching modes.
	37.05 Explain Spanning-Tree Protocol (STP).
	37.06 Define collisions, broadcasts, collision domains, and broadcast domains.
	37.07 Identify the Layer 1, 2, and 3 devices used to create collision domains and broadcast domains.
	37.08 Discuss data flow and problems with broadcasts.
	37.09 Explain network segmentation and list the devices used to create segments.
38.0	Explain the mathematical concepts and protocols behind the internet. – The student will be able to:
	38.01 Explain why the Internet was developed and how TCP/IP fits the design of the Internet.
	38.02 List the four layers of the TCP/IP model.
	38.03 Describe the functions of each layer of the TCP/IP model.
	38.04 Compare the OSI model and the TCP/IP model.
	38.05 Describe the function and structure of IP addresses.
	38.06 Understand why subnetting is necessary.
	38.07 Explain the difference between public and private addressing.
	38.08 Understand the function of reserved IP addresses.
	38.09 Explain the use of static and dynamic addressing for a device.
	38.10 Understand how dynamic addressing can be done using RARP, BootP and DHCP.
	38.11 Use ARP to obtain the MAC address to send a packet to another device.

	38.12 Understand the issues related to addressing between networks.
39.0	Define and explain the difference between routed and routing protocols. – The student will be able to:
	39.01 Describe routed (routable) protocols.
	39.02 List the steps of data encapsulation in an internetwork as data is routed to one or more Layer 3 devices.
	39.03 Describe connectionless and connection-oriented delivery.
	39.04 Name the IP packet fields.
	39.05 Describe process of routing.
	39.06 Compare and contrast different types of routing protocols.
	39.07 List and describe several metrics used by routing protocols.
	39.08 List several uses for subnetting.
	39.09 Determine the subnet mask for a given situation.
	39.10 Use a subnet mask to determine the subnet ID.
40.0	Recognize, define, and explain functions of the transport layer. – The student will be able to:
	40.01 Describe the functions of the TCP/IP transport layer.
	40.02 Describe flow control.
	40.03 Describe the processes of establishing a connection between peer systems.
	40.04 Describe windowing.
	40.05 Describe acknowledgment.
	40.06 Identify and describe transport layer protocols.
	40.07 Describe TCP and UDP header formats.
	40.08 Describe TCP and UDP port numbers and ports used for services and clients.
	40.09 List the major protocols of the TCP/IP application layer.
	40.10 Provide a brief description of the features and operation of well-known TCP/IP applications.
	40.11 Describe TCP and UDP with its function.

	40.12 Describe TCP synchronization and flow control.
	40.13 Describe multiple conversations between hosts.
	40.14 Understand the differences and the relationship between MAC addresses, IP addresses, and port numbers.
41.0	Explain, define, and identify the components of a wan and router. – The student will be able to:
	41.01 Identify organizations responsible for WAN standards.
	41.02 Explain the difference between a WAN and LAN and the type of addresses each uses.
	41.03 Describe the role of a router in a WAN.
	41.04 Identify internal components of the router and describe their functions.
	41.05 Describe the physical characteristics of the router.
	41.06 Identify common ports on a router.
	41.07 Properly connect FastEthernet, serial WAN, and console ports.
42.0	Describe and identify an operating system for a router. – The student will be able to:
	42.01 Describe the purpose of the IOS.
	42.02 Describe the basic operation of the IOS.
	42.03 Identify various IOS features.
	42.04 Identify the methods to establish a CLI session with the router.
	42.05 Move between the user EXEC and privileged EXEC modes.
	42.06 Establish a HyperTerminal session on a router.
	42.07 Log into a router.
	42.08 Use the help feature in the command line interface.
	42.09 Troubleshoot command errors.
	42.10 Name a router.
	42.11 Set passwords.
	42.12 Examine show commands.

	42.13 Configure a serial interface.
	42.14 Configure an Ethernet interface.
	42.15 Execute changes to a router.
	42.16 Save changes to a router.
	42.17 Configure an interface description.
	42.18 Configure a message-of-the-day banner.
	42.19 Configure host tables.
	42.20 Understand the importance of backups and documentation.
43.0	Explain how to establish connections between neighboring routers. – The student will be able to:
	43.01 Enable and disable Protocols.
	43.02 Determine which neighboring devices are connected to which local interfaces.
	43.03 Gather network address information about neighboring devices using CDP.
	43.04 Establish, Verify, Disconnect, Suspend a Telnet connection.
	43.05 Perform alternative connectivity tests.
	43.06 Troubleshoot remote terminal connections.
44.0	Identify and explain the router boot sequence and file system. – The student will be able to:
	44.01 Identify the stages of the router boot sequence.
	44.02 Determine how a router locates and loads its operating system.
	44.03 Use the boot system command.
	44.04 Identify the configuration register values.
	44.05 Briefly describe the files used by the Router IOS and their functions.
	44.06 List the locations on the router of the different file types.
	44.07 Briefly describe the parts of the IOS name.
	44.08 Save and restore configuration files using TFTP and copy-and paste.

	44.09 Load an IOS image using TFTP.
	44.10 Load an IOS image using XModem.
	44.11 Verify the file system using show commands.
45.0	Identify and explain static and dynamic routing protocols. – The student will be able to:
	45.01 Explain the significance of static routing.
	45.02 Configure static and default routes.
	45.03 Verify and troubleshoot static and default routes.
	45.04 Identify the classes of routing protocols.
	45.05 Identify distance vector routing protocols.
	45.06 Identify link-state routing protocols.
	45.07 Describe the basic characteristics of common routing protocols.
	45.08 Identify interior gateway protocols.
	45.09 Identify exterior gateway protocols.
	45.10 Enable Routing Information Protocol (RIP) on a router.
46.0	Describe and configure distance vector protocols. – The student will be able to:
	46.01 Describe how routing loops can occur in distance vector routing.
	46.02 Describe several methods used by distance vector routing protocols to ensure that routing information is accurate.
	46.03 Configure RIP.
	46.04 Use the IP classless command.
	46.05 Troubleshoot RIP.
	46.06 Configure RIP for load balancing.
	46.07 Configure static routes for RIP.
	46.08 Verify RIP.
	46.09 Configure IGRP.

	46.10 Verify IGRP operation.
	46.11 Troubleshoot IGRP.
47.0	Perform tasks related to protocol troubleshooting. – The student will be able to:
	47.01 Describe ICMP.
	47.02 Describe the ICMP message format and error message types.
	47.03 Identify potential causes of specific ICMP error messages.
	47.04 Describe ICMP control messages.
	47.05 Identify a variety of ICMP control messages used in networks today.
	47.06 Determine the causes for ICMP control messages.
48.0	Examine and test networks. – The student will be able to:
	48.01 Use the commands to gather detailed information about the routes installed on the router.
	48.02 Configure a default route or default network.
	48.03 Understand how a router uses both Layer 2 and Layer addressing to move data through the network.
	48.04 Use commands to the router at different OSI layers.
49.0	Define, explain and describe access lists. – The student will be able to:
	49.01 Describe the differences between standard and extended ACLs.
	49.02 Explain the rules for placement of ACLs.
	49.03 Create and apply named ACLs.
	49.04 Describe the function of firewalls.
	49.05 Use ACLs to restrict virtual terminal access.
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.
	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.

Course Number: CTS0023 **Occupational Completion Point: D** **Network Support Administrator – 150 Hours – SOC Code 15-1142**	
55.0	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:
55.01	Develop diplomatic methods to communicate with customers.
56.0	Participate in work-based learning experiences. – The student will be able to:
56.01	Participate in work-based learning experiences in a network support services environment.
56.02	Discuss the use of technology in a network support services environment.
57.0	Provide network support and assistance by troubleshooting and diagnosing through direct contact remote access. – The student will be able to:
57.01	Apply appropriate diagnostic techniques to solve network problems.
57.02	Perform local network support using various troubleshooting and diagnostic techniques.
57.03	Perform remote network support using various remote access methods.
58.0	Develop electronic communications skills. – The student will be able to:
58.01	Exhibit proficiency in using Internet services.
58.02	Exhibit proficiency in downloading and uploading Internet information.
58.03	Perform web-based research to solve specific network problems.
59.0	Perform logical and physical network design activities. – The student will be able to:
59.01	Describe the various LAN communication problems.
59.02	Describe the effects of LAN segmentation with bridges, routers, and switches.
59.03	Describe the operation, characteristics and benefits of VLANS.
59.04	Explain and identify LAN design goals, issues, and methodology.
59.05	Demonstrate the ability to analyze equipment necessary to meet specific design requirement.
59.06	Demonstrate the ability to create physical and logical network implementation documentation.
60.0	Demonstrate proficiency in selecting appropriate various routing protocols and IP routing configuration for various network designs. – The student will be able to:

60.01	Describe the two parts of network addressing, and then identify the parts in specific protocol address examples.
60.02	Create the different classes of IP addresses (and sub netting).
60.03	Configure IP addresses.
60.04	Verify IP addresses.
60.05	Identify the functions of the TCP/IP transport-layer protocols.
60.06	Identify the functions of the TCP/IP network-layer protocols.
60.07	Identify the functions performed by ICMP.
60.08	Configure IPX access lists and SAP filters to control traffic.
60.09	Explain the services of separate and integrated multi-protocol routing.
60.10	List problems that each routing type encounters when dealing with topology changes and describe techniques to reduce the number of these problems.
61.0	Demonstrate proficiency in using network traffic filtering to improve network performance and provide basic levels of security. – The student will be able to:
61.01	Define and describe the purpose and operation of network traffic filtering.
61.02	Demonstrate proficiency in using configuration and interface perform commands to and monitor network traffic filtering.
62.0	Perform network management activities related to documentation, security, performance, administration, troubleshooting and coping with environmental factors. – The student will be able to:
62.01	Perform documentation activities for networks, such as logs, journals, diagrams, labeling schemes, layouts, software listings, user policy, security policy.
62.02	Plan network security measures by establishing security policies and procedures, including user policies, authentication procedures, back-up and data recovery procedures, and redundancy techniques.
62.03	Demonstrate proficiency in using network monitoring software.
62.04	Explain the procedures necessary to monitor, create benchmarks, and plan for improvement of network performance.
62.05	Explain the administrative side of network management, including physical and logical boundaries, costs, error report documentation and the management of human resources.
63.0	Identify and describe various wan functions, devices, and demonstrate understanding of the wan design process. – The student will be able to:
63.01	Describe the functions of private addressing and be able to explain the major features of and configure NAT, PAT, and DHCP.
63.02	Describe the major features of WAN technology, including, devices, standards, encapsulation, link options, and packet and circuit switching.
63.03	Perform WAN design activities that require using the necessary steps in WAN design, the three-layered design model, and various

	other design models.
64.0	Describe the operation and implementation of virtual private networks. – The student will be able to:
	64.01 Describe the virtual private network operation.
	64.02 Describe the virtual private network implementation.
	64.03 Demonstrate an understanding of tunneling.
	64.04 Describe the end-to-end virtual dialup process.
65.0	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:
	65.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	65.02 Explain emergency procedures to follow in response to workplace accidents.
	65.03 Create a disaster and/or emergency response plan.
66.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	66.01 Employ leadership skills to accomplish organizational goals and objectives.
	66.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	66.03 Conduct and participate in meetings to accomplish work tasks.
	66.04 Employ mentoring skills to inspire and teach others.
67.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	67.01 Identify and demonstrate positive work behaviors needed to be employable.
	67.02 Develop personal career plan that includes goals, objectives, and strategies.
	67.03 Examine licensing, certification, and industry credentialing requirements.
	67.04 Maintain a career portfolio to document knowledge, skills, and experience.
	67.05 Evaluate and compare employment opportunities that match career goals.
	67.06 Identify and exhibit traits for retaining employment.
	67.07 Identify opportunities and research requirements for career advancement.
	67.08 Research the benefits of ongoing professional development.
	67.09 Examine and describe entrepreneurship opportunities as a career planning option.

Course Number: CTS0024 **Occupational Completion Point: E** **Senior Network Administrator – 150 Hours – SOC Code 15-1143**	
68.0	Participate in work-based learning experiences. – The student will be able to:
68.01	Participate in work-based learning experiences in a network support services environment.
68.02	Discuss the use of technology in a network support services environment.
69.0	Compare and contrast hierarchical network design models and scalable internetworks. – The student will be able to:
69.01	Show proficiency in the use of the three-layer hierarchical design model.
69.02	Describe router functions in the core layer, distribution layer, and access layer.
69.03	Describe key characteristics of making the network reliable, available, responsive, efficient, adaptable, accessible, scalable and secure.
69.04	Compare and contrast Equal-Cost load balancing with RIP and Unequal-Cost load balancing with IGRP.
70.0	Discuss advanced IP addressing management. – The student will be able to:
70.01	Describe and explain IPv4 addressing, Internet's address architecture, classes of IP addresses, and perform subnet masking.
70.02	Understand and explain Classless Interdomain Routing (CIDR), route aggregation, supernetting and address allocation.
70.03	Discuss and explain Variable-Length Subnet Masks along with classless and classfull routing protocols.
70.04	Compare and contrast route summarization and route flapping.
70.05	Describe and discuss Network Address Translation (NAT), private addressing with NAT, private IP addresses (RFC 1918) and discontiguous subnets.
70.06	Use IP unnumbered and DHCP operations.
70.07	Configure IOS DHCP server, Easy IP and IP helper addresses.
70.08	Discuss IP addressing crisis and solutions with IPv6 address formats.
70.09	Configure IP unnumbered in a lab setting.
71.0	Demonstrate proficiency in basic router configuration. – The student will be able to:
71.01	Build ‘Start.TXT’, capture hyperterminal and telnet sessions, create access control list and extended pings, and configure VLSM using routing fundamentals.
71.02	Configure static routing and dynamic routing using distance-vector routing protocols, link-state routing protocols, and hybrid routing.
71.03	Configure static default routes and default routing with IGRP using default route caveats and floating static routes.

71.04	Describe and explain convergence issues and route calculation fundamentals.
71.05	Start routing process using various configurations, initiate routing updates and routing metrics.
71.06	Show proficiency in migrating from RIP to EIGRP.
71.07	Configuring default routing with RIP and IGRP, configuring floating static routes.
72.0	Demonstrate proficiency in the use of OSPF. – The student will be able to:
72.01	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.
72.02	Establish router adjacencies, elect a DR and a BDR, and discover routes.
72.03	Select appropriate routes and maintain routing information configuring OSPF on routers within a single area.
72.04	Use optional configuration commands and configure OSPF over NBMA in a lab setting.
72.05	Describe Full-Mesh Frame Relay, Partial-Mesh Frame Relay, Point-to-Multipoint OSPF.
73.0	Understand and discuss multi-area OSPF operation and configuration. – The student will be able to:
73.01	Configure OSPF, examining the DR/BDR election process.
73.02	Configure Point-to-Multipoint OSPF over frame relay, create multiple OSPF areas, use OSPF router types, and incorporate OSPF LSA and area types.
73.03	Configuring OSPF operation across multiple areas and flooding LSUs to multiple areas, updating the routing table.
73.04	Configure Multi-area OSPF, using and configuring OSPF, multi-area components, and configuring OSPF route summarization.
73.05	Verify OSPF operation, show commands, clear and debug commands.
74.0	Demonstrate the use of stub and totally stubby areas. – The student will be able to:
74.01	Use stub and totally stubby areas.
74.02	Set up stub and totally stub area criteria.
74.03	Configure stub and totally stubby areas.
74.04	Set up a OSPF stub area configuration example.
74.05	Set up a OSPF totally stubby configuration example.
74.06	Monitor multi-area OSPF, verifying multi-area OSPF operation.
74.07	Create a multi-area OSPF.

75.0	Configure and define virtual links. – The student will be able to:
	75.01 Meet the backbone area requirements.
	75.02 Configure virtual links.
	75.03 Set up a virtual link configuration example.
	75.04 Show not-so-stubby areas.
	75.05 Demonstrate how NSSA operates.
	75.06 Configure a stub area and a totally stubby area.
	75.07 Configure an NSSA and configure virtual links.
76.0	Demonstrate proficiency in the use of EIGRP. – The student will be able to:
	76.01 Define and explain EIGRP fundamentals, features, components, operations.
	76.02 Configure and monitor EIGRP in lab exercise.
77.0	Demonstrate proficiency in route optimization. – The student will be able to:
	77.01 Show how to control routing updates, policy routing, and route redistribution.
	77.02 Create a route optimization configuration in lab setting.
78.0	Demonstrate proficiency in the use of BGP. – The student will be able to:
	78.01 Define and explain autonomous systems and basic BGP operations.
	78.02 Configure and monitor BGP operations and routing process.
	78.03 Define and explain BGP attributes and the BGP decision process.
	78.04 Create BGP configuration in lab setting.
	78.05 Develop a scaling BGP and route reflectors.
	78.06 Set up BGP route filtering and policy routing.
	78.07 Explain the community attribute and peer groups.
	78.08 Explain redundancy, symmetry, and load balancing.
	78.09 Define and explain BGP redistribution.

	78.10 Perform scaling BGP lab exercises and configure BGP in a lab setting.
79.0	Define and show proficiency in security. – The student will be able to:
	79.01 Show proficiency in securing router access using access lists.
	79.02 Show proficiency in using dynamic access lists using lock-and-key.
	79.03 Show proficiency in session filtering.
	79.04 Define and explain context-based access control.
	79.05 Use an alternative to access lists.
	79.06 Configure router security in a lab setting.
80.0	Using lab equipment, demonstrate the setup, configuration, connectivity of routers to create a small WAN. – The student will be able to:
	80.01 Demonstrate the use of remote access.
	80.02 Select appropriate WAN technologies for different scenarios.
	80.03 Select remote access solutions for different technologies.
	80.04 Assemble and Cable WAN components.
81.0	Show the process of using modems and asynchronous dialup connections. – The student will be able to:
	81.01 List, describe and verify modem functions.
	81.02 Configure asynchronous interfaces and terminal lines.
	81.03 Demonstrate proficiency in the creation of modem configurations.
	81.04 Configuring a Windows PC dialup connection.
	81.05 Use dialup connection configurations.
82.0	Configure and verify PPP configurations. – The student will be able to:
	82.01 Demonstrate the use of PPP authentication, PPP callback, PPP compression, and PPP multilink.
	82.02 Create and verifying PPP configurations.
83.0	Configure and monitor ISDN and DDR. – The student will be able to:
	83.01 Explain and discuss ISDN architecture and ISDN protocol layers.

	83.02 Configure ISDN BRI Dial-on-Demand, static routing and default routing, and ISDN PRI.
	83.03 Create optional configurations.
	83.04 Monitor the ISDN interface.
	83.05 Create ISDN configurations.
84.0	Configure dialer profiles. – The student will be able to:
	84.01 Demonstrate the use of Legacy DDR.
	84.02 Create and use various dialer profiles.
	84.03 Verify and monitor dialer profiles configurations.
85.0	Create and trouble-shoot x.25 configurations. – The student will be able to:
	85.01 Show proficiency in the use of X.25 concepts.
	85.02 Configure and Trouble-shoot X.25.
86.0	Configure and trouble-shoot frame relay. – The student will be able to:
	86.01 Show proficiency using frame relay concepts.
	86.02 Configure frame relay.
	86.03 Create various frame relay topologies and configurations.
	86.04 Demonstrate proficiency managing frame relay traffic.
	86.05 Show the process of frame relay traffic shaping.
	86.06 Create on demand routing using frame relay.
	86.07 Trouble-shoot frame relay traffic configurations.
87.0	Demonstrate the use of WAN backup and dial backup. – The student will be able to:
	87.01 Demonstrate dial backup.
	87.02 Demonstrate backup interface operations.
	87.03 Demonstrate routing with the load backup feature.
	87.04 Verifying dial backup configurations in a lab setting.

	87.05 Create various WAN backup configurations in a lab setting.
88.0	Demonstrate the use of queuing and compression techniques. – The student will be able to:
	88.01 Demonstrate proficiency using various queuing options.
	88.02 Demonstrate proficiency optimizing traffic flow with data compression.
89.0	Demonstrate the use of scaling IP addresses with NAT. – The student will be able to:
	89.01 Define and explain NAT concepts and terminology.
	89.02 Demonstrate proficiency in configuring, creating and verifying NAT configurations in lab setting.
90.0	Demonstrate proficiency using AAA to scale access control. – The student will be able to:
	90.01 List and define AAA concepts and terminology.
	90.02 Demonstrate proficiency configuring AAA.
	90.03 Perform lab exercises using access control configurations.
91.0	Discuss and explain emerging remote-access technologies. – The student will be able to:
	91.01 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).
92.0	Demonstrate proficiency configuring a 700 series router. – The student will be able to:
	92.01 Use a series router.
	92.02 Configure the 700 Series router in a lab setting.
	92.03 Use various IOS configurations in a lab setting.
93.0	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:
	93.01 Discuss the requirements of the evolving campus structure and the issues with traditional network designs.
	93.02 Describe the fundamental campus elements and contributing variables to campus networks.
	93.03 Compare and contrast the traditional 80/20 rule of network traffic and the new 20/80 rule of network traffic.
	93.04 Discuss switching and the OSI model, layer 2, 3, and 4 switching, and multiplayer switching.
	93.05 Discuss the core layer, the distribution layer, and the access layer in relation to switching.
	93.06 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.
94.0	Understand and describe campus networks, design models, and switching technologies. – The student will be able to:
	94.01 List and explain key characteristics of various switching technologies.
	94.02 Discuss LAN switching and the hierarchical model of network design.
	94.03 Show proficiency using the building-block approach to networking.
95.0	List and describe various types of LAN media. – The student will be able to:
	95.01 Show proficiency using modem functions and maintaining modem auto-configurations.
	95.02 Create configurations for asynchronous connections.
	95.03 Create various modem configurations.
96.0	Show proficiency configuring a switch. – The student will be able to:
	96.01 Demonstrate the process for initial connectivity to a switch.
	96.02 Show proficiency creating the basic configuration of a switch.
	96.03 List and explain important IOS features.
97.0	Demonstrate proficiency configuring VLANS. – The student will be able to:
	97.01 Understand and explain VLANs.
	97.02 Discuss VLAN basics and VLAN types.
	97.03 Configure a VLAN in a lab setting.
	97.04 Show use of VLAN identification techniques and VLAN trunking protocol.
	97.05 Create VTP configuration and use VTP pruning.
98.0	Understand and explain spanning tree protocol (STP) and redundant links. – The student will be able to:
	98.01 Discuss Basic STP Operations and STP Processes.
	98.02 Compare and contrast VLANs and STP.
	98.03 Show how STP is used in the Campus Network.
	98.04 Demonstrate the resolution of Redundant Links.

99.0	Demonstrate proficiency routing between VLANS. – The student will be able to:
	99.01 Understand and discuss VLAN issues.
	99.02 Route switch modules.
	99.03 Show proficiency using external routers in a lab setting.
100.0	Demonstrate proficiency with multilayer switching. – The student will be able to:
	100.01 Define and explain MLS Processes.
	100.02 Create basic MLS configurations.
	100.03 Show proficiency using flow masks.
	100.04 Show how to use MLS on the switch.
101.0	Demonstrate the use of hot standby routing protocol (HSRP). – The student will be able to:
	101.01 Define and explain HSRP operations.
	101.02 Create HSRP configurations in a lab setting.
102.0	Understand and use IGMP and multicasting. – The student will be able to:
	102.01 Define and explain multicasting.
	102.02 Understand and discuss IGMP.
	102.03 Show proficiency routing multicast traffic.
	102.04 Demonstrate proficiency using multicast routing protocols.
	102.05 Configure IP multicast routing in a lab setting.
	102.06 List and describe optional IP multicast routing tasks**.**
103.0	Demonstrate proficiency restricting network access. – The student will be able to:
	103.01 Show proficiency creating networking policies.
	103.02 Discuss and explain basic network security techniques.
	103.03 Demonstrate execution of policy configurations on a set of routers.
104.0	Demonstrate proficiency using network troubleshooting tools and basic network management diagnostic tools. – The student will be able to:

104.01	Explain and discuss troubleshooting methodologies and general problem-solving concepts.
104.02	List and define general considerations in troubleshooting.
104.03	Define and explain each component of the general problem-solving model.
104.04	Demonstrate proficiency using common management and diagnostic tools.
104.05	Show proficiency using network management software.
104.06	Demonstrate proficiency using router diagnostic commands.
104.07	Familiarize logging and error message formats.
104.08	Demonstrate proficiency interacting with technical support.
105.0	List and define the commonly used protocols, routing techniques, and switching processes. – The student will be able to:
105.01	List and define network services, layer 2 LAN protocols, and layer 2 WAN protocols.
105.02	Race packets through a router.
105.03	Define and explain packet switching paths.
105.04	Identify performance issues affecting packet switching.
105.05	Define and explain low-level troubleshooting.
106.0	Demonstrate proficiency troubleshooting TCP/IP, LAN switch environment, VLANS, frame relay, and ISDN. – The student will able to:
106.01	List, define, and explain theory, concepts, and terminology of TCP/IP, LAN switch environment, spanning tree, VLANs, frame relay, and ISDN.
106.02	List, define, and explain common problems with TCP/IP, LAN switching, and ISDN.
106.03	List, define, and explain common scenarios with VLANs, frame relay, and ISDN.
106.04	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 ISDN problem isolation.
106.05	Use show commands to verify LAN switch configuration settings.
106.06	Use show and debug commands for TCP/IP, router VLANs, frame relay, and ISDN.
106.07	Use TCP/IP diagnostic tools.
107.0	Demonstrate proficiency configuring and trouble-shooting IPX and APPLETALK. – The student will be able to:
107.01	List, define, and explain theory, concepts, and terminology of IPX and AppleTalk.

	107.02 Demonstrate proficiency configuring IPX and AppleTalk.
	107.03 Demonstrate proficiency trouble shooting IPX and AppleTalk.
	107.04 Demonstrate proficiency using show and debug command with IPX and AppleTalk.
108.0	Demonstrate proficiency troubleshooting EIGRP, OSPF, and BGP. – The student will be able to:
	108.01 List, define, and explain theory, concepts, and terminology of EIGRP, OSPF, and BGP.
	108.02 Demonstrate proficiency configuring AAA, EIGRP, OSPF, and BGP.
	108.03 Demonstrate proficiency trouble shooting EIGRP, OSPF, and BGP.
	108.04 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**	
109.0	Participate in work-based learning experiences. – The student will be able to:
109.01	Participate in work-based learning experiences in a network support services environment.
109.02	Discuss the use of technology in a network support services environment.
109.03	Discuss the management/supervisory skills needed in a network support service environment.
110.0	Demonstrate proficiency in applying radio frequency (RF) technologies. – The student will be able to:
110.01	Define and apply the basic concepts of RF behavior.
110.02	Understand the applications of basic RF antenna concepts.
110.03	Understand and apply the basic components of RF.
110.04	Identify some of the different uses for spread spectrum technologies.
110.05	Comprehend the differences between, and apply the different types of spread spectrum technologies.
110.06	Identify and apply the concepts which make up the functionality of spread spectrum technology.
110.07	Identify the laws set forth by the FCC that govern spread spectrum technology, including power outputs, frequencies, bandwidths, hop times, and dwell times.
111.0	Develop an awareness of wireless LAN technologies. – The student will be able to:
111.01	Identify and apply the processes involved in authentication and association.
111.02	Recognize the concepts associated with wireless LAN service sets.
111.03	Understand the implications of the following power management features of wireless LANs.
111.04	Specify the modes of operation involved in the movement of data traffic across wireless LANs.
112.0	Perform implementation and management activities. – The student will be able to:
112.01	Identify the technology roles for which wireless LAN technology is an appropriate technology application.
112.02	Identify the purpose of infrastructure devices and explain how to install, configure, and manage them.
112.03	Identify the purpose of wireless LAN client devices and explain how to install, configure, and manage them.

112.04	Identify the purpose of wireless LAN gateway devices and explain how to install, configure, and manage them.
112.05	Identify the basic attributes, purpose, and function of types of antennas.
112.06	Describe the proper locations and methods for installing antennas.
112.07	Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antennas.
112.08	Identify the use of wireless LAN accessories and explain how to install, configure, and manage them.
112.09	Identify, understand, correct or compensate for wireless LAN implementation challenges.
112.10	Explain how antenna diversity compensates for multipath.
112.11	Identify and understand the importance and process of conducting a thorough site survey.
112.12	Identify and understand the importance of the necessary tasks involved in preparing to do an RF site survey.
112.13	Identify the necessary equipment involved in performing a site survey.
112.14	Understand the necessary procedures involved in performing a site survey.
112.15	Identify and understand site survey reporting procedures.
113.0	Develop an awareness of wireless security systems. – The student will be able to:
113.01	Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques.
113.02	Describe types of wireless LAN security attacks, and explain how to identify and prevent them.
113.03	Given a wireless LAN scenario, identify the appropriate security solution from the following available wireless LAN security solutions.
113.04	Explain the uses of corporate security policies and how they are used to secure a wireless LAN.
113.05	Identify how and security precautions are used to secure a wireless LAN.
114.0	Demonstrate knowledge of wireless industry standards. – The student will be able to:
114.01	Identify, apply and comprehend the differences between wireless LAN standards.
114.02	Understand the roles of organizations in providing direction and accountability within the wireless LAN industry.
114.03	Identify the differences between the ISM and UNII bands.
114.04	Identify and understand the differences between the power output rules for point-to-point and point-to-multipoint links.
114.05	Identify the basic characteristics of infrared wireless LANs.

Course Number: EEV0317 **Occupational Completion Point: G** **Data Communications Analyst – 150 Hours – SOC Code 15-1143**
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/supervisors skills needed in a network support services environment.
116.0 Demonstrate a knowledge of general security concepts. – The student will be able to:
116.01 Describe access control.
116.02 Describe network authentication.
116.03 Understand the various types of network attacks (backdoors, DOS, spoofing).
116.04 Identify and modify non-essential services and protocols.
116.05 Identify malicious code (virus, worm, Trojan).
116.06 Configure system auditing, logging, and scanning as it relates to security procedures.
117.0 Develop an awareness of communication security concepts. – The student will be able to:
117.01 Describe remote access protocols (VPN, RADIUS, L2TP).
117.02 Identify E-mail security concerns (hoaxes, spam).
117.03 Identify web (HTML) security concepts and designs (HTTP/S, IM).
117.04 Demonstrate an awareness of file transfer security concerns.
117.05 Describe and identify wireless networking security concerns and vulnerabilities.
118.0 Develop an awareness of network infrastructure security. – The student will be able to:
118.01 Install and configure network firewalls.
118.02 Identify security concerns with various wiring media (copper, fiber).
118.03 Identify security concerns associated with removable media and storage devices.
118.04 Demonstrate an awareness of security topologies (security zones, Intranets, NAT).

118.05	Configure and use intrusion detection software.
118.06	Establish security baselines (updates, patches, hot fixes, Access Control lists).
118.07	Demonstrate the ability to configure a Virtual Private Network (VPN).
118.08	Describe the function of Network Address Translation (NAT)**.**
119.0	Develop an awareness of cryptography and its relation to security. – The student will be able to:
119.01	Demonstrate an understanding of security algorithms and encryption.
119.02	Use and apply Public Key Certificates.
119.03	Demonstrate an understanding of standards and protocols in commerce.
120.0	Incorporate organizational and operational security in an appropriate and effective manner. – The student will be able to:
120.01	Describe how to establish a network security policy.
120.02	Explain the importance of physical security to protect network resources.
120.03	Identify and use disaster recovery procedures.
120.04	Describe the importance of business continuity and its relationship to network and corporate security.
120.05	Describe security policies and procedures that would be used in a business environment.
120.06	Explain the importance of privilege management (access, password management, sign-on).
120.07	Describe the concept of forensics as it applies to network security (obtaining evidence of security breaches).
120.08	Explain the importance of educating users and supervisors in regard to network security.
120.09	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
30.0 Participate in work-based learning experiences.
31.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
32.0 Perform installation and configuration activities.
33.0 Demonstrate proficiency using computer networks.
34.0 Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers.
35.0 Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability.
36.0 Demonstrate proficiency in managing, configuring and troubleshooting storage use.
37.0 Demonstrate proficiency in configuring and troubleshooting network connections.
38.0 Demonstrate proficiency in implementing, monitoring, and troubleshooting security.
39.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
40.0 Solve problems using critical thinking skills, creativity and innovation.
41.0 Use information technology tools.
42.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
43.0 Describe the importance of professional ethics and legal responsibilities.
44.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
45.0 Participate in work-based learning experiences.
46.0 Administer accounts and resources on computers running server operating system software in a networked environment.
47.0 Modify user and computer accounts on computers running a server operating system in a networked environment.
48.0 Perform various administrative functions using groups.
49.0 Enable resource access with permissions, manage access to files and folders using permissions, and manage permission inheritance.
50.0 Implement printing in a networked environment utilizing a particular server operating system.
51.0 Set up a network-wide printing strategy to meet the needs of users and troubleshoot installation or configuration problems.
52.0 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.
53.0 Use group policy to configure folder redirection, browser connectivity, and the desktop.
54.0 Manage computer security in a networking environment.
55.0 Administer servers remotely.
56.0 Monitor server performance by using performance tools, configure and manage performance logs, configure and manage alerts, and manage system monitor views.
57.0 Collect performance data by monitoring primary server subsystems and identify system bottlenecks by using the performance monitoring software.
58.0 Maintaining device drivers.
59.0 Use software tools to manage and set up disks.
60.0 Use file encryption for security of data.
61.0 Plan for a computer disaster and use the features of a server operating system to prevent a disaster or recover when one occurs.
62.0 Manage and distribute critical software updates that resolve known security vulnerabilities and other stability issues.
63.0 Construct and assign IP addresses and isolate addressing issues associated with the IP routing process.

64.0 Configure an internet protocol (IP) address for client computers.
65.0 Configure name resolution mechanisms for clients on a network and describe the name resolution process.
66.0 Isolate common connectivity issues and describe how to use utilities and tools as part of this process.
67.0 Configure a routing solution for a network environment.
68.0 Allocate IP addressing in a network environment.
69.0 Manage the DHCP service to reflect changing client IP addressing needs and monitor DHCP server performance.
70.0 Assign computer names to the IP addresses of the source and destination hosts, and then use the computer name to contact the hosts.
71.0 Resolve host names by using domain name system.
72.0 Manage and monitor DNS servers to ensure that they are functioning properly and to optimize network performance.
73.0 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.
74.0 Manage and monitor network access and the network access services.
75.0 Perform installation of a network client operating system.
76.0 Install and configure hardware devices.
77.0 Configure and manage file systems.
78.0 Troubleshoot the boot process and other system issues.
79.0 Configure the desktop.
80.0 Configure IP addresses and name resolution.
81.0 Configure the client to work in a network environment.
82.0 Support remote users.
83.0 Configure a client OS for mobile computing.
84.0 Monitor resources and performance.
85.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
86.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
87.0 Explain the importance of employability skill and entrepreneurship skills.
88.0 Apply communication skills (reading, writing, speaking, listening, and viewing) in a courteous, concise, and correct manner on personal and professional levels.
89.0 Participate in work-based learning experiences.
90.0 Plan a network infrastructure.
91.0 Plan and optimize a TCP/IP physical and logical network.
92.0 Plan and troubleshoot routing.
93.0 Plan a DHCP strategy.
94.0 Plan a DNS strategy.
95.0 Optimize and troubleshoot DNS.
96.0 Plan and troubleshoot IPSEC.
97.0 Plan a network access.
98.0 Troubleshoot network access.
99.0 Analyze global director infrastructure.
100.0 Implement a global directory structure and domain.
101.0 Implement an organizational unit structure.
102.0 Implement user, group, and computer accounts.

103.0 Implement group policy.
104.0 Deploy and manage software by using group policies.
105.0 Implement sites to manage global directory replication.
106.0 Implement placement of domain controllers.
107.0 Use a framework for designing security and create a security design team.
108.0 Recognize and predict common threats by using a threat model.
109.0 Apply a framework for planning risk management.
110.0 Design security for physical resources.
111.0 Design security for computers.
112.0 Design security for accounts.
113.0 Design security for authentication.
114.0 Design security for data.
115.0 Design security for data transmission.
116.0 Design security for network perimeter.
117.0 Design an audit policy and an incident response procedure.
118.0 Participate in work-based learning experiences.
119.0 Demonstrate proficiency in applying radio frequency (RF) technologies.
120.0 Develop an awareness of wireless LAN technologies.
121.0 Perform implementation and management activities.
122.0 Develop an awareness of wireless security systems.
123.0 Demonstrate knowledge of wireless industry standards.
124.0 Participate in work-based learning experiences.
125.0 Demonstrate knowledge of general security concepts.
126.0 Develop an awareness of communication security concepts.
127.0 Develop an awareness of network infrastructure security.
128.0 Develop an awareness of cryptography and its relation to security.
129.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications–The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

12.09	Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
13.01	Identify elements of a Web page.
13.02	Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
13.03	Define basic HTML terminology.
13.04	Analyze HTML source code developed by others.
13.05	Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
13.06	Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
13.07	Edit and test HTML documents for accuracy and validity.
13.08	Use basic functions of WYSIWYG editors.
13.09	Use basic functions of HTML, DHTML, and XML editors and converters.
13.10	Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
14.01	Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
14.02	Describe and apply color theory as it applies to Web page design (e.g., background and text color).
14.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
14.04	Use image design software to create and edit images.
14.05	Demonstrate proficiency in publishing to the Internet.
14.06	Demonstrate proficiency in adding downloadable forms to web pages.
14.07	Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
15.01	Compare and contrast various methods of evaluation for emerging technologies.
15.02	Demonstrate knowledge of the process of planning upgrades and changeovers.
15.03	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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).

Course Number: EEV0504 **Occupational Completion Point: B** **Computer Support Assistant – 150 Hours – SOC Code 15-1151**	
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 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.
	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).
	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 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 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.
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 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: CTS0026 **Occupational Completion Point: C** **Network Support Technician – 150 Hours – SOC Code 15-1142**	
29.0	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:
	29.01 Develop diplomatic methods to communicate with customers.
30.0	Participate in work-based learning experiences. – The student will be able to:
	30.01 Participate in work-based learning experiences in a network support services environment.
	30.02 Discuss the use of technology in a network environment.
31.0	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:
	31.01 Apply first response assistance for minor repair work.
32.0	Perform installation and configuration activities. – The student will be able to:
	32.01 Configure the operating system environment.
	32.02 Connect client workstation running similar operating system to the network.
	32.03 Configure Internet access for a network.
	32.04 Configure a Web server.
	32.05 Use remote server to deploy operating system.
	32.06 Troubleshoot failed installations.
	32.07 Install and configure network services for interoperability.
	32.08 Monitor, configure troubleshoot and control access to printers.
	32.09 Monitor, configure troubleshoot and control access to files, folders, and shared folders.
	32.10 Monitor, configure troubleshoot and control access to Web sites.
33.0	Demonstrate proficiency using computer networks. – The student will be able to:
	33.01 Identify and describe the purpose of standards, protocols, and the Open Systems Interconnection (OSI) reference model.
34.0	Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers. – The student will be able to:

	34.01 Configure hardware devices.
	34.02 Configure driver signing options.
	34.03 Update device drivers.
	34.04 Troubleshoot problems with hardware.
35.0	Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability. – The student will be able to:
	35.01 Monitor and optimize usage of system resources.
	35.02 Manage processes.
	35.03 Optimize disk performance.
	35.04 Manage and optimize availability of system data and user data.
	35.05 Recover systems and user data.
36.0	Demonstrate proficiency in managing, configuring and troubleshooting storage use. – The student will be able to:
	36.01 Configure and manage user profiles.
	36.02 Monitor, configure and troubleshoot disks and volumes.
	36.03 Configure data compression.
	36.04 Monitor and configure disk quotas.
	36.05 Recover from disk failures.
37.0	Demonstrate proficiency in configuring and troubleshooting network connections. – The student will be able to:
	37.01 Install, configure and troubleshoot shared access.
	37.02 Install, configure and troubleshoot a virtual private network.
	37.03 Install, configure and troubleshoot network protocols.
	37.04 Install and configure network services.
	37.05 Configure, monitor and troubleshoot remote access.
	37.06 Install, configure, monitor, and troubleshoot Terminal Services.
	37.07 Configure the properties of a connection.

	37.08 Install, configure, and troubleshoot network adapters and drivers.
38.0	Demonstrate proficiency in implementing, monitoring, and troubleshooting security. – The student will be able to:
	38.01 Encrypt data on a hard disk by using Encrypting File System.
	38.02 Implement, configure, manage and troubleshoot policies in an operating system environment.
	38.03 Implement, configure, manage and troubleshoot auditing.
	38.04 Implement, configure, manage and troubleshoot local accounts.
	38.05 Implement, configure, manage and troubleshoot account policy.
	38.06 Implement, configure, manage and troubleshoot security by using the Security Configuration Tool Set.
39.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	39.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	39.02 Locate, organize and reference written information from various sources.
	39.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	39.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	39.05 Apply active listening skills to obtain and clarify information.
	39.06 Develop and interpret tables and charts to support written and oral communications.
	39.07 Exhibit public relations skills that aid in achieving customer satisfaction.
40.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	40.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	40.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	40.03 Identify and document workplace performance goals and monitor progress toward those goals.
	40.04 Conduct technical research to gather information necessary for decision-making.
41.0	Use information technology tools. – The student will be able to:
	41.01 Use personal information management (PIM) applications to increase workplace efficiency.
	41.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.

	41.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	41.04 Employ collaborative/groupware applications to facilitate group work.
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.
	42.02 Explain the effect of key organizational systems on performance and quality.
	42.03 List and describe quality control systems and/or practices common to the workplace.
	42.04 Explain the impact of the global economy on business organizations.
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.
	43.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	43.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	43.04 Interpret and explain written organizational policies and procedures.

Course Number: CTS0027 **Occupational Completion Point: D** **Systems Administrator – 150 Hours – SOC Code 15-1142**	
44.0	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:
44.01	Develop diplomatic methods to communicate with customers, clients, and end-users of information technology services.
45.0	Participate in work-based learning experiences. – The student will be able to:
45.01	Participate in work-based learning experiences in a network support services environment.
45.02	Discuss the use of technology in a network support services environment.
45.03	Discuss the management/supervisors skills needed in a network support services environment.
46.0	Administer accounts and resources on computers running server operating system software in a networked environment. – The student will be able to:
46.01	Describe features of server operating system.
46.02	Log on to the server operating system.
46.03	Install and configure administrative tools.
46.04	Create user accounts.
46.05	Create computer accounts.
46.06	Create an organizational unit.
47.0	Modify user and computer accounts on computers running a server operating system in a networked environment. – The student will be able to:
47.01	Modify user and computer account properties.
47.02	Enable and unlock user and computer accounts.
47.03	Create a user account template.
47.04	Locate user and computer accounts in a global directory structure.
47.05	Save queries.
47.06	Reset user and computer accounts.
47.07	Move domain objects.

48.0	Perform various administrative functions using groups. – The student will be able to:
	48.01 Create groups.
	48.02 Manage group membership.
	48.03 Apply strategies for using groups.
	48.04 Modify groups.
49.0	Enable resource access with permissions, manage access to files and folders using permissions, and manage permission inheritance. – The student will be able to:
	49.01 Manage access to resources.
	49.02 Manage access to shared folders.
	49.03 Manage access to files and folders by using file system permissions.
	49.04 Determine effective permissions.
	49.05 Manage access to shared files by using offline caching.
50.0	Implement printing in a networked environment utilizing a particular server operating system. – The student will be able to:
	50.01 Install and share printers.
	50.02 Manage access to printers by using shared printer permissions.
	50.03 Manage printer drivers.
	50.04 Implement printer locations.
51.0	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:
	51.01 Change the location of the print spooler.
	51.02 Set printing priorities.
	51.03 Schedule printer availability.
	51.04 Configure a printing tool.
52.0	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:
	52.01 Identify the role of organizational units.

	52.02 Modify permissions for global directory objects.
	52.03 Delegate control of organizational units.
53.0	Use group policy to configure folder redirection, browser connectivity, and the desktop. – The student will be able to:
	53.01 Configure group policy settings.
	53.02 Assign scripts with group policy.
	53.03 Configure folder redirection.
54.0	Manage computer security in a security in a networking environment. – The student will be able to:
	54.01 Describe the security features a server operating system.
	54.02 Use security templates to secure computers.
	54.03 Test computer security policy.
	54.04 Configure auditing.
	54.05 Manage security logs.
55.0	Administer servers remotely. – The student will be able to:
	55.01 Explain the tasks, tools, and rights that are required to administer a server.
	55.02 Configure remote access for administration and client preferences.
	55.03 Manage remote desktop connections.
56.0	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:
	56.01 Establish a performance baseline.
	56.02 Perform real-time and logged monitoring.
	56.03 Configure and manage counter logs.
	56.04 Configure alerts.
57.0	Collect performance data by monitoring primary server subsystems and identify system bottlenecks by using the performance monitoring software. – The student will be able to:
	57.01 Explain how the four primary server subsystems affect server performance.
	57.02 Monitor server memory.

	57.03 Monitor processor usage.
	57.04 Monitor disks.
	57.05 Monitor network usage.
	57.06 Identify the guidelines for using counters and thresholds.
	57.07 Describe the best practices for monitoring server performance**.**
58.0	Maintaining device drivers. – The student will be able to:
	58.01 Configure device driver signing.
	58.02 Restore the previous version of a device driver.
59.0	Use software tools to manage and set up disks. – The student will be able to:
	59.01 Initialize and partition a disk.
	59.02 View and update disk properties.
	59.03 Manage mounted drives.
	59.04 Create volumes on a disk.
	59.05 Convert a disk from basic to dynamic and from dynamic to basic.
	59.06 Import disks.
60.0	Use file encryption for security of data. – The student will be able to:
	60.01 Manage disk based file compression.
	60.02 Configure file encryption.
	60.03 Implement disk quotas.
61.0	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:
	61.01 Prepare for disaster recovery.
	61.02 Back up data.
	61.03 Schedule backup jobs.
	61.04 Restore data.

	61.05 Configure a shadow copy.
	61.06 Recover from server failure.
	61.07 Select a disaster recovery method.
62.0	Manage and distribute critical software updates that resolve known security vulnerabilities and other stability issues. – The student will be able to:
	62.01 Install and configure client computers to use receive software updates.
	62.02 Install and configure servers to use perform software updates.
	62.03 Manage the Software Update Services infrastructure.
63.0	Construct and assign IP addresses and isolate addressing issues associated with the IP routing process. – The student will be able to:
	63.01 Convert IP Addresses from decimal to binary.
	63.02 Calculate a subnet mask.
	63.03 Create subnets using VLSM and CIDR.
	63.04 Isolate addressing issues associated with the IP routing process.
64.0	Configure an internet protocol (IP) address for client computers. – The student will be able to:
	64.01 Configure a client to use a static IP address.
	64.02 Configure a client to obtain an IP address automatically by using DHCP.
	64.03 Configure a client to obtain an IP address automatically by using Alternate Configuration.
65.0	Configure name resolution mechanisms for clients on a network and describe the name resolution process. – The student will be able to:
	65.01 Use ARP to identify client media access control (MAC) addresses.
	65.02 Describe the function of Network Basic Input/Output System (NetBIOS).
	65.03 Configure a client to use a static IP address.
	65.04 Configure a client to use name resolution servers.
66.0	Isolate common connectivity issues and describe how to use utilities and tools as part of this process. – The student will be able to:
	66.01 Isolate common connectivity issues.
	66.02 Use a flow chart to isolate a problem.

	66.03 Use utilities and tools to isolate a problem.
67.0	Configure a routing solution for a network environment. – The student will be able to:
	67.01 Describe the role of routing in the network infrastructure.
	67.02 Enable and configure the Routing and Remote Access service.
	67.03 Configure packet filters.
68.0	Allocate IP addressing in a network environment. – The student will be able to:
	68.01 Describe the role of DHCP in the network infrastructure.
	68.02 Add and authorize a DHCP Server service.
	68.03 Configure a DHCP scope.
	68.04 Configure DHCP options.
	68.05 Configure a DHCP reservation**.**
	68.06 Configure a DHCP relay agent.
69.0	Manage the DHCP service to reflect changing client IP addressing needs and monitor DHCP server performance. – The student will be able to:
	69.01 Manage a DHCP database.
	69.02 Monitor DHCP.
	69.03 Apply security guidelines for DHCP.
70.0	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:
	70.01 Describe the name resolution process.
	70.02 View names on a client.
	70.03 Configure host name resolution.
71.0	Resolve host names by using domain name system. – The student will be able to:
	71.01 Describe the role of DNS in the network infrastructure.
	71.02 Install the DNS Server service.
	71.03 Configure the properties for the DNS Server service.

	71.04 Configure the DNS zones.
	71.05 Configure DNS zone transfers.
	71.06 Configure dynamic updates.
	71.07 Configure a DNS client.
	71.08 Delegate authority for zones.
72.0	Manage and monitor DNS servers to ensure that they are functioning properly and to optimize network performance. – The student will be able to:
	72.01 Configure the Time-to-Live (TTL) value.
	72.02 Configure aging and scavenging.
	72.03 Integrate DNS with WINS.
	72.04 Test the DNS server configuration.
	72.05 Monitor DNS server performance**.**
73.0	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:
	73.01 Describe a network access infrastructure.
	73.02 Configure a virtual private network (VPN) connection.
	73.03 Configure a dial-up connection.
	73.04 Configure a wireless connection.
	73.05 Control remote user access to a network.
	73.06 Centralize authentication and policy management for network access by using Internet Authentication Service (IAS).
74.0	Manage and monitor network access and the network access services. – The student will be able to:
	74.01 Configure logging on the network access server.
	74.02 Collect and monitor network access data.
75.0	Perform installation of a network client operating system. – The student will be able to:
	75.01 Plan a client operating system installation.
	75.02 Install a client operating system.

	75.03 Upgrade a client operating system from an earlier version.
	75.04 Automate the installation process for a client operating system.
76.0	Install and configure hardware devices. – The student will be able to:
	76.01 Configure hardware devices and drivers on a computer running a client OS.
	76.02 Add and remove devices by using built in utilities and wizards.
	76.03 Restore device drivers.
77.0	Configure and manage file systems. – The student will be able to:
	77.01 Work with file systems.
	77.02 Manage data compression.
	77.03 Secure data by using EFS.
	77.04 Configure disk compression.
	77.05 Secure files by using EFS.
78.0	Troubleshoot the boot process and other system issues. – The student will be able to:
	78.01 Examine the boot process.
	78.02 Control system settings during the boot process.
	78.03 Change startup behavior.
	78.04 Use advanced boot options to troubleshoot startup problems.
	78.05 Restore a computer to a previous state.
	78.06 Troubleshoot the boot process and other system issues.
79.0	Configure the desktop. – The student will be able to:
	79.01 Configure user desktop settings.
	79.02 Customize the desktop environment.
	79.03 Configure system settings.
	79.04 Describe how user profiles and group policy affect desktop customization.

80.0	Configure IP addresses and name resolution. – The student will be able to:
80.01	Configure IP addresses.
80.02	Troubleshoot IP addresses.
80.03	Determine TCP/IP name resolution methods.
80.04	Configure a DNS and WINS client.
80.05	Connect to a remote host.
80.06	Configure IP addresses.
80.07	Configure the DNS client.
81.0	Configure the client to work in a network environment. – The student will be able to:
81.01	Examine workgroups and user accounts.
81.02	Create and authenticate local user accounts.
81.03	Configure local security.
81.04	Configure logon options.
81.05	Configure networking.
81.06	Join a domain.
81.07	Operate in a domain.
82.0	Support remote users. – The student will be able to:
82.01	Establish remote access connections.
82.02	Connect to Virtual Private Networks.
82.03	Configure inbound connections.
82.04	Configure authentication protocols and encryption.
82.05	Using remote desktop.
82.06	Store user names and passwords to facilitate remote connections.
82.07	Configure a VPN connection.

	82.08 Configure and using remote desktop.
	82.09 Store user names and passwords.
83.0	Configure a client OS for mobile computing. – The student will be able to:
	83.01 Configure hardware for mobile computing.
	83.02 Configure power management options for mobile computing.
	83.03 Make files, folders, and web pages available for offline use.
84.0	Monitor resources and performance. – The student will be able to:
	84.01 Determine system information.
	84.02 Use task manager to monitor system performance.
	84.03 Use performance and maintenance tools to improve performance.
	84.04 Monitor event logs.
	84.05 Configure program compatibility.
85.0	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:
	85.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	85.02 Explain emergency procedures to follow in response to workplace accidents.
	85.03 Create a disaster and/or emergency response plan.
86.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	86.01 Employ leadership skills to accomplish organizational goals and objectives.
	86.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	86.03 Conduct and participate in meetings to accomplish work tasks.
	86.04 Employ mentoring skills to inspire and teach others.
87.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
	87.01 Identify and demonstrate positive work behaviors needed to be employable.
	87.02 Develop personal career plan that includes goals, objectives, and strategies.

87.03	Examine licensing, certification, and industry credentialing requirements.
87.04	Maintain a career portfolio to document knowledge, skills, and experience.
87.05	Evaluate and compare employment opportunities that match career goals.
87.06	Identify and exhibit traits for retaining employment.
87.07	Identify opportunities and research requirements for career advancement.
87.08	Research the benefits of ongoing professional development.
87.09	Examine and describe entrepreneurship opportunities as a career planning option.

Course Number: CTS0028 **Occupational Completion Point: E** **Systems Engineer – 150 Hours – SOC Code 15-1143**	
88.0	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:
	88.01 Communicate technical information in a concise, understandable manner to a non-technical audience both verbally and in writing.
89.0	Participate in work-based learning experiences. – The student will be able to:
	89.01 Participate in work-based learning experiences in a network support services environment.
	89.02 Discuss the use of technology in a network support services environment.
	89.03 Compare and contrast the software applications used in a network support services environment.
90.0	Plan a network infrastructure. – The student will be able to:
	90.01 Explain how to plan a network.
	90.02 Explain how to prepare development and test environments.
	90.03 Explain the concepts of managing and maintaining a network environment by using specific tools.
	90.04 Explain the technologies and services implemented in a network.
91.0	Plan and optimize a TCP/IP physical and logical network. – The student will be able to:
	91.01 Discuss TCP/IP.
	91.02 Plan a TCP/IP addressing scheme.
	91.03 Optimize network performance.
92.0	Plan and troubleshoot routing. – The student will be able to:
	92.01 Describe how routing works.
	92.02 Create a secure routing plan.
	92.03 Identify TCP/IP routing trouble shooting tools.
	92.04 Troubleshoot TCP/IP routing.
93.0	Plan a DHCP strategy. – The student will be able to:

	93.01 Demonstrate how DHCP operates in an enterprise environment.
	93.02 Plan a DHCP strategy.
	93.03 Secure a DHCP strategy.
94.0	Plan a DNS strategy. – The student will be able to:
	94.01 Plan a namespace strategy.
	94.02 Plan zones.
	94.03 Plan zone replication.
	94.04 Plan a DNS server implementation.
95.0	Optimize and troubleshoot DNS. – The student will be able to:
	95.01 Optimize a DNS server.
	95.02 Optimize the DNS server-to-server communications.
	95.03 Optimize DNS client support traffic.
	95.04 Troubleshoot host name resolution.
96.0	Plan and troubleshoot IPSEC. – The student will be able to:
	96.01 Discuss IPSec.
	96.02 Understand IPSec default policies, rules, and settings.
	96.03 Plan IPSec deployment.
	96.04 Troubleshoot IPSec**.**
97.0	Plan a network access. – The student will be able to:
	97.01 Select appropriate connection methods for a network access strategy.
	97.02 Select a remote access policy strategy.
	97.03 Select a network access authentication method.
	97.04 Plan a network access strategy.
98.0	Troubleshoot network access. – The student will be able to:

	98.01 Identify network access troubleshooting resources.
	98.02 Troubleshoot network authentication.
	98.03 Troubleshoot LAN authentication.
	98.04 Troubleshoot remote access.
99.0	Analyze global directory infrastructure. – The student will be able to:
	99.01 Describe the architecture of global directory.
	99.02 Describe the working of global directory.
	99.03 Use administrative tools to examine the components of global directory.
	99.04 Describe the global directory design, planning, and implementation processes.
100.0	Implement a global directory structure and domain structure. – The student will be able to:
	100.01 Create a forest and domain structure.
	100.02 Configure DNS in a global directory environment.
	100.03 Raise the functional level of a forest and a domain.
	100.04 Create trust relationships between domains.
	100.05 Secure trusts by using SID filtering.
101.0	Implement an organizational unit structure. – The student will be able to:
	101.01 Create an organizational unit.
	101.02 Delegate control for an organizational unit.
	101.03 Plan an organization unit strategy.
102.0	Implement user, group, and computer accounts. – The student will be able to:
	102.01 Describe the types of global directory accounts and groups.
	102.02 Create multiple user and computer accounts.
	102.03 Implement UPN suffixes.
	102.04 Move objects within a domain and across domains in a global structure.

	102.05 Plan a strategy for user computer and group accounts.
	102.06 Plan a global directory audit strategy.
103.0	Implement group policy. – The student will be able to:
	103.01 Create and configure group policy objects.
	103.02 Manage group policy objects.
	103.03 Verify and troubleshoot group policies.
	103.04 Delegate administrative control of group policies.
	103.05 Plan a group policies strategy for the enterprise.
104.0	Deploy and manage software by using group policies. – The student will be able to:
	104.01 Explain the basic concepts of software deployment by using group policies.
	104.02 Deploy software by using group policies.
	104.03 Configure software deployment by using group policies.
	104.04 Maintain deployed software by using group policies.
	104.05 Troubleshoot some common problems with software deployment.
	104.06 Plan a software deployment strategy.
105.0	Implement sites to manage global directory replication. – The student will be able to:
	105.01 Explain the components and the process of replication.
	105.02 Create and configure sites.
	105.03 Manage a global directory site topology.
	105.04 Monitor and troubleshoot global directory replication failures.
	105.05 Plan a site strategy.
106.0	Implement placement of domain controllers. – The student will be able to:
	106.01 Implement a global catalog in a global directory.
	106.02 Determine the placement of domain controllers in a global directory.

106.03	Create a plan for placing domain controllers in a global directory.
107.0	Use a framework for designing security and create a security design team. – The student will be able to:
107.01	Describe common elements of security policies and procedures.
107.02	Create a security design framework.
107.03	Create a security design team.
108.0	Recognize and predict common threats by using a threat model. – The student will be able to:
108.01	Explain common network vulnerabilities and how attackers can exploit them.
108.02	Predict threats to security by using the STRIDE (Spoofing, Tampering, Repudiation, Information disclosure, Denial of service, Elevation of privilege) threat model.
109.0	Apply a framework for planning risk management. – The student will be able to:
109.01	Explain the purpose and operation of risk management.
109.02	Draft the elements of a risk management plan.
110.0	Design security for physical resources. – The student will be able to:
110.01	Determine threats and analyze risks to physical resources.
110.02	Design security for physical resources.
111.0	Design security for computers. – The student will be able to:
111.01	Determine threats and analyze risks to computers.
111.02	Design security for computers.
112.0	Design security for accounts. – The student will be able to:
112.01	Determine threats and analyze risks to accounts.
112.02	Design security for accounts.
113.0	Design security for authentication. – The student will be able to:
113.01	Determine threats and analyze risks to authentication.
113.02	Design security for authentication.
114.0	Design security for data. – The student will be able to:

	114.01 Determine threats and analyze risks to data.
	114.02 Design security for data.
115.0	Design security for data transmission. – The student will be able to:
	115.01 Determine threats and analyze risks to data transmission.
	115.02 Design security for data transmission.
116.0	Design security for network perimeters. – The student will be able to:
	116.01 Determine threats and analyze risks to network perimeters.
	116.02 Design security for network perimeters.
117.0	Design an audit policy and an incident response procedure. – The student will be able to:
	117.01 Explain the importance of auditing and incident response.
	117.02 Design an auditing policy.
	117.03 Design an incident response procedure.

Course Number: CTS0029 **Occupational Completion Point: F** **Wireless Network Administrator – 150 Hours – SOC Code 15-1143**
118.0 Participate in work-based learning experiences. – The student will be able to:
118.01 Participate in work-based learning experiences in a network support services environment.
118.02 Discuss the use of technology in a network support services environment.
118.03 Discuss the management/supervisory skills needed in a network support service environment.
119.0 Demonstrate proficiency in applying radio frequency (RF) technologies. – The student will be able to:
119.01 Define and apply the basic concepts of RF behavior.
119.02 Understand the applications of basic RF antenna concepts.
119.03 Understand and apply the basic components of RF.
119.04 Identify some of the different uses for spread spectrum technologies.
119.05 Comprehend the differences between, and apply the different types of spread spectrum technologies.
119.06 Identify and apply the concepts which make up the functionality of spread spectrum technology.
119.07 Identify the laws set forth by the FCC that govern spread spectrum technology, including power outputs, frequencies, bandwidths, hop times, and dwell times.
120.0 Develop an awareness of wireless LAN technologies. – The student will be able to:
120.01 Identify and apply the processes involved in authentication and association.
120.02 Recognize the concepts associated with wireless LAN service sets.
120.03 Understand the implications of the following power management features of wireless LANs.
120.04 Specify the modes of operation involved in the movement of data traffic across wireless LANs.
121.0 Perform implementation and management activities. – The student will be able to:
121.01 Identify the technology roles for which wireless LAN technology is an appropriate technology application.
121.02 Identify the purpose of infrastructure devices and explain how to install, configure, and manage them.
121.03 Identify the purpose of wireless LAN client devices and explain how to install, configure, and manage them.

121.04	Identify the purpose of wireless LAN gateway devices and explain how to install, configure, and manage them.
121.05	Identify the basic attributes, purpose, and function of types of antennas.
121.06	Describe the proper locations and methods for installing antennas.
121.07	Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antennas.
121.08	Identify the use of wireless LAN accessories and explain how to install, configure, and manage them.
121.09	Identify, understand, correct or compensate for wireless LAN implementation challenges.
121.10	Explain how antenna diversity compensates for multipath.
121.11	Identify and understand the importance and process of conducting a thorough site survey.
121.12	Identify and understand the importance of the necessary tasks involved in preparing to do an RF site survey.
121.13	Identify the necessary equipment involved in performing a site survey.
121.14	Understand the necessary procedures involved in performing a site survey.
121.15	Identify and understand site survey reporting procedures.
122.0	Develop an awareness of wireless security systems. – The student will be able to:
122.01	Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques.
122.02	Describe types of wireless LAN security attacks, and explain how to identify and prevent them.
122.03	Given a wireless LAN scenario, identify the appropriate security solution from the following available wireless LAN security solutions.
122.04	Explain the uses of corporate security policies and how they are used to secure a wireless LAN.
122.05	Identify how and security precautions are used to secure a wireless LAN.
123.0	Demonstrate knowledge of wireless industry standards. – The student will be able to:
123.01	Identify, apply and comprehend the differences between wireless LAN standards.
123.02	Understand the roles of organizations in providing direction and accountability within the wireless LAN industry.
123.03	Identify the differences between the ISM and UNII bands.
123.04	Identify and understand the differences between the power output rules for point-to-point and point-to-multipoint links.
123.05	Identify the basic characteristics of infrared wireless LANs.

Course Number: EEV0317 **Occupational Completion Point: G** **Data Communications Analyst – 150 Hours – SOC Code 15-1143**
124.0 Participate in work-based learning experiences. – The student will be able to:
124.01 Participate in work-based learning experiences in a network support services environment.
124.02 Discuss the use of technology in a network support services environment.
124.03 Discuss the management/supervisors skills needed in a network support services environment.
125.0 Demonstrate a knowledge of general security concepts. – The student will be able to:
125.01 Describe access control.
125.02 Describe network authentication.
125.03 Understand the various types of network attacks (backdoors, DOS, spoofing).
125.04 Identify and modify non-essential services and protocols.
125.05 Identify malicious code (virus, worm, Trojan).
125.06 Configure system auditing, logging, and scanning as it relates to security procedures.
126.0 Develop an awareness of communication security concepts. – The student will be able to:
126.01 Describe remote access protocols (VPN, RADIUS, L2TP).
126.02 Identify E-mail security concerns (hoaxes, spam).
126.03 Identify web (HTML) security concepts and designs (HTTP/S, IM).
126.04 Demonstrate an awareness of file transfer security concerns.
126.05 Describe and identify wireless networking security concerns and vulnerabilities.
127.0 Develop an awareness of network infrastructure security. – The student will be able to:
127.01 Install and configure network firewalls.
127.02 Identify security concerns with various wiring media (copper, fiber).
127.03 Identify security concerns associated with removable media and storage devices.
127.04 Demonstrate an awareness of security topologies (security zones, Intranets, NAT).

127.05	Configure and use intrusion detection software.
127.06	Establish security baselines (updates, patches, hot fixes, Access Control lists).
127.07	Demonstrate the ability to configure a Virtual Private Network (VPN).
127.08	Describe the function of Network Address Translation (NAT).
128.0	Develop an awareness of cryptography and its relation to security. – The student will be able to:
128.01	Demonstrate an understanding of security algorithms and encryption.
128.02	Use and apply Public Key Certificates.
128.03	Demonstrate an understanding of standards and protocols in commerce.
129.0	Incorporate organizational and operational security in an appropriate and effective manner. – The student will be able to:
129.01	Describe how to establish a network security policy.
129.02	Explain the importance of physical security to protect network resources.
129.03	Identify and use disaster recovery procedures.
129.04	Describe the importance of business continuity and its relationship to network and corporate security.
129.05	Describe security policies and procedures that would be used in a business environment.
129.06	Explain the importance of privilege management (access, password management, sign-on).
129.07	Describe the concept of forensics as it applies to network security (obtaining evidence of security breaches).
129.08	Explain the importance of educating users and supervisors in regard to network security.
129.09	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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
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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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	1050 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	450 hours	15-1199
B	DIG0073	Digital Media Artist	300 hours	27-1014
C	DIG0074	Digital Media Specialist	300 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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	300 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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.
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.
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 and 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.
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.
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.
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. – The student will be able to:
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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 when implemented at either the secondary or postsecondary level.

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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 Demonstrate proficiency with operational procedure.
07.0 Demonstrate language arts knowledge and skills.
08.0 Demonstrate mathematics knowledge and skills.
09.0 Demonstrate proficiency with installing, configuring, and troubleshooting personal computer hardware.
10.0 Demonstrate proficiency with troubleshooting operating systems.
11.0 Demonstrate proficiency with networking.
12.0 Demonstrate proficiency with security.
13.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
14.0 Solve problems using critical thinking skills, creating and innovation.
15.0 Use information technology tools.
16.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
17.0 Describe the importance of professional ethics and legal responsibilities.
18.0 Describe the operation of data networks.
19.0 Differentiate between various network media and topologies.
20.0 Install and configure basic network devices.
21.0 Implement an IP addressing scheme to meet network requirements.
22.0 Demonstrate an understanding of network management tasks and methodologies.
23.0 Demonstrate proficiency using basic network tools.
24.0 Implement a Wireless Local Area Network (WLAN).
25.0 Demonstrate an understanding of network security threats and mitigation techniques.
26.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
28.0 Explain the importance of employability skill and entrepreneurship skills.
29.0 Configure, verify and troubleshoot a switch with VLANs and interswitch communications.
30.0 Implement an IP addressing scheme and IP Services to meet network requirements in a medium-size Enterprise branch office network.
31.0 Configure, verify, and troubleshoot basic router operation and routing on Cisco devices.
32.0 Explain and select the appropriate administrative tasks required for a WLAN.
33.0 Identify security threats to a network and describe general methods to mitigate those threats.
34.0 Implement, verify, and troubleshoot NAT and ACLs in a medium-size Enterprise branch office network.
35.0 Implement and verify WAN links.
36.0 Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends.
37.0 Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk.

38.0 Recognize and be able to differentiate and explain the following access control models.
39.0 Recognize and be able to differentiate and explain the following methods of authentication.
40.0 Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk.
41.0 Recognize and understand the processes and risks associated with the following security concerns and tasks.
42.0 Recognize and understand the administration of the following types of remote access technologies.
43.0 Recognize and understand the administration of the following email security concepts.
44.0 Recognize and understand the administration of the following Internet security concepts.
45.0 Recognize and understand the administration of the following vulnerabilities.
46.0 Recognize and understand the administration of the following directory security concepts.
47.0 Recognize and understand the administration of the following file transfer protocols and concepts.
48.0 Recognize and understand the administration of the following wireless technologies and concepts.
49.0 Compare and contrast the following types of intrusion detection in terms of implementation and configuration.
50.0 Be able to identify and explain the following different kinds of cryptographic algorithms.
51.0 Understand how cryptography and digital signatures address the following security concepts.
52.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure).
53.0 Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles.
54.0 Understand the application of the following concepts of physical security.
55.0 Understand security concerns and concepts of the following types of devices.
56.0 Understand the security concerns for the following types of media.
57.0 Explain the following security topologies as they relate to cybersecurity.
58.0 Implement the process of network system hardening within a computer network.
59.0 Implement the process of server application/service hardening within a computer network.
60.0 Describe the security implications of the following topics of disaster recovery options.
61.0 Understand the security implications of the following topics of business continuity.
62.0 Demonstrate proficiency in applying the concepts and uses of the following types of policies and procedures.
63.0 Explain the following concepts of privilege management.
64.0 Demonstrate an understanding of the concepts of the following topics of forensics.
65.0 Understand and be able to explain the following concepts of risk identification.
66.0 Understand the security relevance of the education and training of end users, executives and human resources.
67.0 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.
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	Determine the troubleshooting methods and tools for printers.
02.04	Explain and interpret common laptop issues and determine the appropriate basic troubleshooting method.
02.05	Integrate common preventative maintenance techniques.

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 and their features.
	03.02	Given a scenario, demonstrate proper use of user interfaces.
	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.
04.0	Demonstrate proficiency with networking. – The student will be able to:	
	04.01	Summarize the basics of networking fundamentals, including technologies, devices and protocols.
	04.02	Categorize network cables and connectors and their implementations.
	04.03	Compare and contrast the different network types.
05.0	Demonstrate proficiency with security. – The student will be able to:	
	05.01	Explain the basic principles of security concepts and technologies.
	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	Demonstrate proficiency with operational procedure. – The student will be able to:	
	06.01	Outline the purpose of appropriate safety and environmental procedures and given a scenario apply them.
	06.02	Given a scenario, demonstrate the appropriate use of communication skills and professionalism in the workplace.
07.0	Demonstrate language arts knowledge and skills. – The student will be able to:	
	07.01	Locate, comprehend and evaluate key elements of oral and written information.
	07.02	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	07.03	Present information formally and informally for specific purposes and audiences.

08.0	Demonstrate mathematics knowledge and skills. – The student will be able to:	
	08.01	Demonstrate knowledge of arithmetic operations.
	08.02	Analyze and apply data and measurements to solve problems and interpret documents.
	08.03	Construct charts/tables/graphs using functions and data.
09.0	Demonstrate proficiency with installing, configuring, and troubleshooting personal computer hardware. – The student will be able to:	
	09.01	Install, configure and maintain personal computer components.
	09.02	Detect problems, troubleshoot and repair/replace personal computer components.
	09.03	Install, configure, detect problems, troubleshoot and repair/replace laptop components.
	09.04	Select and use the following tools:
		09.04.1 Multimeter.
		09.04.2 Power supply tester.
		09.04.3 Specialty hardware/tools.
		09.04.4 Cable testers.
		09.04.5 Loop back plugs.
		09.04.6 Anti-static pad and wrist strap.
		09.04.7 Extension magnet.
		09.04.8 Detect and resolve common printer issues.
10.0	Demonstrate proficiency with troubleshooting operating systems. – The student will be able to:	
	10.01	Select the appropriate commands and options to troubleshoot and resolve problems.
	10.02	Differentiate between Windows Operating System directory structures (Windows 2000, XP, Vista, Windows 7, Windows 8).
	10.03	Given a scenario, select and use system utilities/tools and evaluate the results.
	10.04	Evaluate and resolve common issues.
11.0	Demonstrate proficiency with networking. – The student will be able to:	
	11.01	Troubleshoot client-side connectivity issues using appropriate tools.
	11.02	Install and configure a small office home office (SOHO) network.

12.0	Demonstrate proficiency with security. – The student will be able to:
12.01	Given a scenario, prevent, troubleshoot and remove viruses and malware.
12.02	Implement security and troubleshoot common issues.
13.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
13.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
13.02	Locate, organize and reference written information from various sources.
13.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
13.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.
13.05	Apply active listening skills to obtain and clarify information.
13.06	Develop and interpret tables and charts to support written and oral communications.
13.07	Exhibit public relations skills that aid in achieving customer satisfaction.
14.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
14.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.
14.02	Employ critical thinking and interpersonal skills to resolve conflicts.
14.03	Identify and document workplace performance goals and monitor progress toward those goals.
14.04	Conduct technical research to gather information necessary for decision-making.
15.0	Use information technology tools. – The student will be able to:
15.01	Use personal information management (PIM) applications to increase workplace efficiency.
15.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
15.03	Employ computer operations applications to access, create, manage, integrate, and store information.
15.04	Employ collaborative/groupware applications to facilitate group work.
16.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
16.01	Describe the nature and types of business organizations.

16.02	Explain the effect of key organizational systems on performance and quality.
16.03	List and describe quality control systems and/or practices common to the workplace.
16.04	Explain the impact of the global economy on business organizations.
17.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
17.01	Evaluate and justify decisions based on ethical reasoning.
17.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
17.03	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
17.04	Interpret and explain written organizational policies and procedures.

Course Number: CTS0083 **Occupational Completion Point: B** **Computer Network Technician – 150 Hours – SOC Code 15-1142**
18.0 Describe the operation of data networks. – The student will be able to:
18.01 Explain the function of common networking protocols.
18.02 Identify commonly used TCP and UDP default ports.
18.03 Identify address formats.
18.04 Identify the proper use of addressing technologies and addressing schemes.
18.05 Identify common IPv4 and IPv6 routing protocols.
18.06 Explain the purpose and properties of routing.
18.07 Compare the characteristics of wireless communication standards.
18.08 Interpret network diagrams.
18.09 Describe common networking applications.
19.0 Differentiate between various network media and topologies. – The student will be able to:
19.01 Categorize standard cable types and their properties.
19.02 Identify common connector types.
19.03 Identify common physical network topologies.
19.04 Differentiate and implement appropriate wiring standards.
19.05 Select the appropriate media, cables, ports, and connectors to connect network devices.
19.06 Categorize WAN technology types and properties.
19.07 Categorize LAN technology types and properties.
19.08 Explain common logical network topologies and their characteristics.
19.09 Install components of wiring distribution.

20.0	Install and configure basic network devices. – The student will be able to:
20.01	Install, configure and differentiate between common network devices.
20.02	Identify the functions of specialized network devices.
20.03	Explain the advanced features of a switch.
20.04	Implement a small switched network, including remote access management.
20.05	Verify network status and operation using basic utilities (e.g., ping, traceroute, telnet, SSH, arp, ipconfig).
20.06	Implement a basic wireless network.
21.0	Implement an IP addressing scheme to meet network requirements. – The student will be able to:
21.01	Assign and verify valid IP addresses in a LAN environment.
21.02	Describe Network Address Translation (NAT) and its importance in network communication.
21.03	Distinguish between public and private IP addresses.
21.04	Configure, verify, and troubleshoot DHCP and DNS operation.
21.05	Implement static and dynamic IP addressing.
21.06	Detect and correct IP addressing issues.
22.0	Demonstrate an understanding of network management tasks and methodologies. – The student will be able to:
22.01	Explain the function of each layer of the OSI model.
22.02	Identify types of configuration management documentation.
22.03	Evaluate the network based on configuration management documentation.
22.04	Explain network segmentation and traffic management concepts.
22.05	Conduct network monitoring to identify performance and connectivity issues.
22.06	Explain different methods and rationales for network performance optimization.
22.07	Implement network troubleshooting methodologies.
22.08	Troubleshoot common connectivity issues and select an appropriate solution.
23.0	Demonstrate proficiency using basic network tools. – The student will be able to:

	23.01 Select the appropriate command line interface tool and interpret the output to verify functionality.
	23.02 Explain the purpose of network scanners.
	23.03 Utilize the appropriate hardware tools.
24.0	Implement a Wireless Local Area Network (WLAN). – The student will be able to:
	24.01 Describe the standards associated with wireless media.
	24.02 Identify and describe the purpose of the components of a small WLAN.
	24.03 Configure a small WLAN such that devices connect to the correct access point.
	24.04 Describe the security features and capabilities of WI-FI Protected Access (WPA).
	24.05 Describe common issues with implementing a WLAN and methods for addressing these issues.
25.0	Demonstrate an understanding of network security threats and mitigation techniques. – The student will be able to:
	25.01 Explain the function of hardware and software security devices.
	25.02 Explain common features of a firewall.
	25.03 Explain the methods of network access security.
	25.04 Explain methods of user authentication.
	25.05 Explain issues that affect device security.
	25.06 Implement password and physical security in a small routed network.
	25.07 Identify common security threats and mitigation techniques.
26.0	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:
	26.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	26.02 Explain emergency procedures to follow in response to workplace accidents.
	26.03 Create a disaster and/or emergency response plan.
27.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:

27.01	Employ leadership skills to accomplish organizational goals and objectives.
27.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
27.03	Conduct and participate in meetings to accomplish work tasks.
27.04	Employ mentoring skills to inspire and teach others.
28.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
28.01	Identify and demonstrate positive work behaviors needed to be employable.
28.02	Develop personal career plan that includes goals, objectives and strategies.
28.03	Examine licensing, certification and industry credentialing requirements.
28.04	Maintain a career portfolio to document knowledge, skills and experience.
28.05	Evaluate and compare employment opportunities that match career goals.
28.06	Identify and exhibit traits for retaining employment.
28.07	Identify opportunities and research requirements for career advancement.
28.08	Research the benefits of ongoing professional development.
28.09	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**	
29.0	Configure, verify and troubleshoot a switch with VLANs and interswitch communications. – The student will be able to:
29.01	Select the appropriate media, cables, ports, and connectors to connect switches to other network devices and hosts.
29.02	Explain the technology and media access control method for Ethernet networks.
29.03	Explain network segmentation and basic traffic management concepts.
29.04	Explain basic switching concepts and the operation of Cisco switches.
29.05	Perform and verify initial switch configuration tasks including remote access management.
29.06	Verify network status and switch operation using basic utilities (including: ping, traceroute, telnet, SSH, arp, ipconfig), SHOW & DEBUG commands.
29.07	Identify, prescribe and resolve common switched network media issues, configuration issues, auto negotiation and switch hardware failures.
29.08	Describe enhanced switching technologies (including: VTP, RSTP, VLAN, PVSTP, 802.1q).
29.09	Describe how VLANs create logically separate networks and the need for routing between them.
29.10	Configure, verify and troubleshoot VLANs.
29.11	Configure, verify and troubleshoot trunking on Cisco switches.
29.12	Configure, verify and troubleshoot interVLAN routing.
29.13	Configure, verify and troubleshoot VTP.
29.14	Configure, verify and troubleshoot RSTP operation.
29.15	Interpret the output of various SHOW and DEBUG commands to verify the operational status of a Cisco switched network.
29.16	Implement basic switch security (including: port security, trunk access, management VLAN other than VLAN1).
30.0	Implement an IP addressing scheme and IP Services to meet network requirements in a medium-size Enterprise branch office network– The student will be able to:
30.01	Describe the operation and benefits of using private and public IP addressing.
30.02	Explain the operation and benefits of using DHCP and DNS.
30.03	Configure, verify and troubleshoot DHCP and DNS operation on a router (e.g., CLI/SDM).

	30.04	Implement static and dynamic addressing services for hosts in a LAN environment.
	30.05	Calculate and apply an addressing scheme including VLSM IP addressing design to a network.
	30.06	Determine the appropriate classless addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN/WAN environment.
	30.07	Describe the technological requirements for running IPv6 in conjunction with IPv4 (e.g., protocols, dual stack, tunneling).
	30.08	Describe IPv6 addresses.
	30.09	Identify and correct common problems associated with IP addressing and host configurations.
31.0	Configure, verify, and troubleshoot basic router operation and routing on Cisco devices. – The student will be able to:	
	31.01	Describe basic routing concepts (e.g., packet forwarding, router lookup process).
	31.02	Describe the operation of Cisco routers (e.g., router bootup process, POST, router components).
	31.03	Select the appropriate media, cables, ports and connectors to connect routers to other network devices and hosts.
	31.04	Configure, verify and troubleshoot RIPv2.
	31.05	Access and utilize the router to set basic parameters (e.g., CLI/SDM).
	31.06	Connect, configure and verify operation status of a device interface.
	31.07	Verify device configuration and network connectivity using ping, traceroute, telnet, SSH or other utilities
	31.08	Perform and verify routing configuration tasks for a static or default route given specific routing requirements.
	31.09	Manage IOS configuration files (e.g., save, edit, upgrade, restore).
	31.10	Manage Cisco IOS.
	31.11	Compare and contrast methods of routing and routing protocols.
	31.12	Configure, verify, and troubleshoot OSPF.
	31.13	Configure, verify, and troubleshoot EIGRP.
	31.14	Verify network connectivity (including: using ping, traceroute, telnet or SSH).
	31.15	Troubleshoot routing issues.
	31.16	Verify router hardware and software operation using SHOW & DEBUG commands.
	31.17	Implement basic router security.

32.0	Explain and select the appropriate administrative tasks required for a WLAN. – The student will be able to:
32.01	Describe standards associated with wireless media (including: IEEE WI-FI Alliance, ITU/FCC).
32.02	Identify and describe the purpose of the components in a small wireless network. (Including: SSID, BSS, ESS).
32.03	Identify the basic parameters to configure on a wireless network to ensure that devices connect to the correct access point.
32.04	Compare and contrast wireless security features and capabilities of WPA security (including: open, WEP, WPA-1/2).
32.05	Identify common issues with implementing wireless networks. (Including: interface, misconfiguration).
33.0	Identify security threats to a network and describe general methods to mitigate those threats. – The student will be able to:
33.01	Describe today's increasing network security threats and explain the need to implement a comprehensive security policy to mitigate the threats.
33.02	Explain general methods to mitigate common security threats to network devices, hosts, and applications.
33.03	Describe the functions of common security appliances and applications.
33.04	Describe security recommended practices including initial steps to secure network devices.
34.0	Implement, verify, and troubleshoot NAT and ACLs in a medium-size Enterprise branch office network. – The student will be able to:
34.01	Describe the purpose and types of ACLs.
34.02	Configure and apply ACLs based on network filtering requirements (including: CLI/SDM).
34.03	Configure and apply an ACLs to limit telnet and SSH access to the router using (including: SDM/CLI).
34.04	Verify and monitor ACLs in a network environment.
34.05	Troubleshoot ACL issues.
34.06	Explain the basic operation of NAT.
34.07	Configure NAT for given network requirements using (including: CLI/SDM).
34.08	Troubleshoot NAT issues.
35.0	Implement and verify WAN links. – The student will be able to:
35.01	Describe different methods for connecting to a WAN.
35.02	Configure and verify a basic WAN serial connection.
35.03	Configure and verify Frame Relay on Cisco routers.

35.04	Troubleshoot WAN implementation issues.
35.05	Describe VPN technology (including: importance, benefits, role, impact, components).
35.06	Configure and verify a PPP connection between Cisco routers.

Course Number: CTS0069 **Occupational Completion Point: D** **Computer Security Technician – 300 Hours – SOC Code 15-1122**	
36.0	Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends. – The student will be able to:
36.01	Describe the history of cybersecurity, including the evolution of a hacker culture.
36.02	Discuss the trends and national initiatives related to cybersecurity.
36.03	Distinguish between information assurance and cybersecurity.
36.04	Describe the concepts of confidentiality as it relates to user and data impact.
36.05	Explain authentication and the concept of non-repudiation.
37.0	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:
37.01	Viruses.
37.02	Trojan Horses.
37.03	Logic Bombs.
37.04	Worms.
38.0	Recognize and be able to differentiate and explain the following access control models. – The student will be able to:
38.01	MAC (Mandatory Access Control).
38.02	DAC (Discretionary Access Control).
38.03	RBAC (Role Based Access Control).
39.0	Recognize and be able to differentiate and explain the following methods of authentication. – The student will be able to:
39.01	Kerberos.
39.02	CHAP (Challenge Handshake Authentication Protocol).
39.03	Certificates.
39.04	Username/Password.
39.05	Tokens.

	39.06 Multi-factor.
	39.07 Mutual.
	39.08 Biometrics.
40.0	Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:
	40.01 DOS/DDOS (Denial of Service/Distributed Denial of Service).
	40.02 Back Door.
	40.03 Spoofing.
	40.04 Man in the Middle.
	40.05 Replay.
	40.06 TCP/IP Hijacking.
	40.07 Weak Keys.
	40.08 Mathematical.
	40.09 Social Engineering.
	40.10 Birthday.
	40.11 Password Guessing (e.g., Brute Force, Dictionary).
	40.12 Software Exploitation.
41.0	Recognize and understand the processes and risks associated with the following security concerns and tasks. – The student will be able to:
	41.01 Identify non-essential services and protocols and know what actions to take to reduce the risks of those services and protocols.
	41.02 Understand the concept of and know how reduce the risks of social engineering.
	41.03 Understand the concept and significance of auditing, logging and system scanning.
	41.04 Identify and be able to differentiate different cryptographic standards and protocols.
42.0	Recognize and understand the administration of the following types of remote access technologies. – The student will be able to:
	42.01 802.1x.
	42.02 VPN (Virtual Private Network).

	42.03 RADIUS (Remote Authentication Dial-In User Service).
	42.04 TACACS (Terminal Access Controller Access Control System).
	42.05 L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).
	42.06 SSH (Secure Shell).
	42.07 IPSEC (Internet Protocol Security).
	42.08 Vulnerabilities.
43.0	Recognize and understand the administration of the following email security concepts. – The student will be able to:
	43.01 S/MIME (Secure Multipurpose Internet Mail Extensions).
	43.02 PGP (Pretty Good Privacy) like technologies.
	43.03 Vulnerabilities.
	43.04 SPAM.
	43.05 Hoaxes.
44.0	Recognize and understand the administration of the following Internet security concepts. – The student will be able to:
	44.01 SSL/TLS (Secure Sockets Layer/Transport Layer Security).
	44.02 HTTP/S (Hypertext Transfer Protocol/Hypertext Transfer Protocol over Secure Sockets Layer).
	44.03 Instant Messaging (i.e., Vulnerabilities, Packet Sniffing, Privacy).
45.0	Recognize and understand the administration of the following vulnerabilities. – The student will be able to:
	45.01 Java Script.
	45.02 ActiveX.
	45.03 Buffer Overflows.
	45.04 Cookies.
	45.05 Signed Applets.
	45.06 CGI (Common Gateway Interface).
	45.07 SMTP (Simple Mail Transfer Protocol) Relay.

46.0	Recognize and understand the administration of the following directory security concepts. – The student will be able to:
	46.01 SSL/TLS (Secure Sockets Layer/Transport Layer Security).
	46.02 LDAP (Lightweight Directory Access Protocol).
47.0	Recognize and understand the administration of the following file transfer protocols and concepts. – The student will be able to:
	47.01 S/FTP (File Transfer Protocol).
	47.02 Blind FTP (File Transfer Protocol)/Anonymous.
	47.03 File Sharing.
	47.04 Vulnerabilities (i.e., packet sniffing, naming conventions).
48.0	Recognize and understand the administration of the following wireless technologies and concepts. – The student will be able to:
	48.01 WTLS (Wireless Transport Layer Security).
	48.02 802.11 and 802.11x.
	48.03 WEP/WAP (Wired Equivalent Privacy/Wireless Application Protocol).
	48.04 Vulnerabilities (i.e., site surveys).
49.0	Compare and contrast the following types of intrusion detection in terms of implementation and configuration. – The student will be able to:
	49.01 Network Based – Active and Passive.
	49.02 Host Based – Active and Passive.
	49.03 Honey Pots.
	49.04 Incident Response.
50.0	Be able to identify and explain the following different kinds of cryptographic algorithms. – The student will be able to:
	50.01 Hashing.
	50.02 Symmetric.
	50.03 Asymmetric.
51.0	Understand how cryptography and digital signatures address the following security concepts. – The student will be able to:
	51.01 Confidentiality.

	51.02 Integrity.
	51.03 Authentication.
	51.04 Non-Repudiation.
	51.05 Access Control.
52.0	Understand and be able to explain the following concepts of PKI (Public Key Infrastructure). – The student will be able to:
	52.01 Certificates (e.g., policies, practice statements).
	52.02 Revocation.
	52.03 Trust Models.
53.0	Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles. – The student will be able to:
	53.01 Centralized versus Decentralized.
	53.02 Hardware versus software key storage.
	53.03 Private key storage.
	53.04 Escrow.
	53.05 Expiration.
	53.06 Revocation versus suspension (e.g., status checking).
	53.07 Recovery authorization schema (e.g., M-of-N Control - Of M appropriate individuals, N must be present to authorize recovery).
	53.08 Renewal.
	53.09 Destruction.
	53.10 Key Usage.
	53.11 Multiple Key Pairs (Single, Dual).
54.0	Understand the application of the following concepts of physical security. – The student will be able to:
	54.01 Access Control (e.g., physical barriers, biometrics).
	54.02 Social Engineering.
	54.03 Environment (e.g., wireless cells, location, shielding, fire suppression).

55.0	Understand security concerns and concepts of the following types of devices. – The student will be able to:
55.01	Firewalls.
55.02	Routers.
55.03	Switches.
55.04	Wireless.
55.05	Modems.
55.06	RAS (Remote Access Server).
55.07	Telecom/PBX (Private Branch Exchange).
55.08	VPN (Virtual Private Network).
55.09	IDS (Intrusion Detection System).
55.10	Network Monitoring/Diagnostics.
55.11	Workstations.
55.12	Servers.
55.13	Mobile Devices.
56.0	Understand the security concerns for the following types of media. – The student will be able to:
56.01	Coaxial Cable.
56.02	UTP/STP (Unshielded Twisted Pair/Shielded Twisted Pair).
56.03	Fiber Optic Cable.
56.04	Removable Media.
56.05	Tape.
56.06	CD-R (Recordable Compact Disks).
56.07	Hard Drives.
56.08	Diskettes.
56.09	Flashcards.

	56.10 Smartcards.
57.0	Explain the following security topologies as they relate to cybersecurity. – The student will be able to:
	57.01 Security Zones.
	57.02 DMZ (Demilitarized Zone).
	57.03 Intranet.
	57.04 Extranet.
	57.05 VLANs (Virtual Local Area Network).
	57.06 NAT (Network Address Translation).
	57.07 Tunneling.
58.0	Implement the process of network system hardening within a computer network. – The student will be able to:
	58.01 Updates (Firmware & Software).
	58.02 Operating System.
	58.03 Configuration.
	58.04 Enabling and Disabling Services and Protocols.
	58.05 Access Control Lists.
59.0	Implement the process of server application/service hardening within a computer network. – The student will be able to:
	59.01 Updates (Hotfixes, Service Packs, Patches).
	59.02 Web Servers.
	59.03 E-mail Servers.
	59.04 FTP (File Transfer Protocol) Servers.
	59.05 DNS (Domain Name Service) Servers.
	59.06 NNTP (Network News Transfer Protocol) Servers.
	59.07 File/Print Servers.
	59.08 DHCP (Dynamic Host Configuration Protocol) Servers.

	59.09 Data Repositories.
	59.10 Directory Services.
	59.11 Databases.
60.0	Describe the security implications of the following topics of disaster recovery options. – The student will be able to:
	60.01 Backups (On-site versus off-site storage).
	60.02 Secure Recovery.
	60.03 Alternate Sites.
	60.04 Disaster Recovery Plan.
61.0	Understand the security implications of the following topics of business continuity. – The student will be able to:
	61.01 Utilities.
	61.02 High Availability/Fault Tolerance.
	61.03 Backups.
62.0	Demonstrate proficiency in applying the concepts and uses of the following types of policies and procedures. – The student will be able to:
	62.01 Security Policy.
	62.02 Acceptable Use.
	62.03 Due Care.
	62.04 Privacy.
	62.05 Separation of Duties.
	62.06 Need to Know.
	62.07 Password Management.
	62.08 SLAs (Service Level Agreements).
	62.09 Disposal/Destruction.
	62.10 HR policies related to passwords, privileges, and Code of Ethics in hiring and termination situations.
	62.11 Incident Response Policy.

63.0	Explain the following concepts of privilege management. – The student will be able to:
	63.01 User/Group/Role Management.
	63.02 Single Sign-on.
	63.03 Centralized vs. Decentralized.
	63.04 Auditing (Privilege, Usage, Escalation).
	63.05 MAC/DAC/RBAC (Mandatory Access Control/Discretionary Access Control/Role Based Access Control).
64.0	Demonstrate an understanding of the concepts of the following topics of forensics. – The student will be able to:
	64.01 Chain of Custody.
	64.02 Preservation of Evidence.
	64.03 Collection of Evidence.
65.0	Understand and be able to explain the following concepts of risk identification. – The student will be able to:
	65.01 Asset Identificat*io*n.
	65.02 Risk Assessment.
	65.03 Threat Identification.
	65.04 Vulnerabilities.
66.0	Understand the security relevance of the education and training of end users, executives and human resources. – The student will be able to:
	66.01 Communication.
	66.02 User Awareness.
	66.03 Education.
	66.04 On-line Resources.
67.0	Explain the following documentation and their role in cybersecurity. – The student will be able to:
	67.01 Standards and Guidelines.
	67.02 Systems Architecture.
	67.03 Change Documentation.

67.04 Logs and Inventories.
67.05 Classification/Notification Schema.
67.06 Retention/Storage.
67.07 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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	1350 hours*
Teacher Certification	BUS ED 1 @2 COMPU SCI 6 CYBER 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

*See Program Structure

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 six occupational completion points (OCPs). **To complete this program, students must complete OCP A plus one or more of the subsequent OCPs (B-F). Program hours may be 750, 900, 1050, 1200 or 1350 hours depending on the number of subsequent OCPs completed.**

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
C	CTS0021	Data Security Specialist	150 hours	15-1122
D	CTS0060	Software Security Specialist	150 hours	15-1122
E	CTS0085	Web Security Specialist	150 hours	15-1122
F	CTS0089	Information Security Administrator	150 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 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: C** **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: D** **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: E** **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: F** **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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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. Secondary or postsecondary students who have previously completed the IT Core will not have to repeat the core. 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.

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

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 Demonstrate comprehension and communication skills.
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Develop an awareness of management functions and organizational structures as they relate to today's workplace and employer/ employee roles.
05.0 Practice quality performance in the learning environment and the workplace.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
08.0 Assess personal strengths and weaknesses as they relate to job objectives, career exploration, personal development, and life goals.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate human relations/interpersonal skills appropriate for the workplace.
11.0 Participate in work-based learning experiences.
12.0 Perform e-mail activities.
13.0 Demonstrate knowledge of different operating systems.
14.0 Demonstrate proficiency navigating the internet, intranet, and the WWW.
15.0 Demonstrate proficiency using HTML commands.
16.0 Demonstrate proficiency in page design applicable to the WWW.
17.0 Demonstrate proficiency using specialized web design software.
18.0 Develop an awareness of the information technology industry.
19.0 Develop an awareness of microprocessors and digital computers.
20.0 Develop an awareness of programming languages.
21.0 Develop an awareness of emerging technologies.
22.0 Demonstrate an understanding of the seven layers of the open systems interface (OSI) model.
23.0 Demonstrate proficiency using common software applications.
24.0 Demonstrate proficiency using specialized software applications.
25.0 Demonstrate language arts knowledge and skills.
26.0 Demonstrate mathematics knowledge and skills
27.0 Explain the importance of employability skill and entrepreneurship skills.
28.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
29.0 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.
30.0 Diagnose and troubleshoot common module problems and system malfunctions of computer software, hardware, peripherals, and other office equipment.

31.0 Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
32.0 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.
33.0 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.
34.0 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.
35.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, internet, remote access, or direct contact.
36.0 Demonstrate proficiency using graphical user interface (GUI) operating systems.
37.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
38.0 Participate in work-based learning experiences.
39.0 Perform end user support and assistance by troubleshooting and diagnosing through telephone, e-mail, remote access, or direct contact.
40.0 Perform installation and configuration activities.
41.0 Demonstrate proficiency using computer networks.
42.0 Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers.
43.0 Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability.
44.0 Demonstrate proficiency in managing, configuring and troubleshooting storage use.
45.0 Demonstrate proficiency in configuring and troubleshooting network connections.
46.0 Demonstrate proficiency in implementing, monitoring, and troubleshooting security.
47.0 Evaluate an analyze cloud principles used in cloud computing.
48.0 Identify the components of cloud based services.
49.0 Evaluate cloud based services.
50.0 Use cloud-based services.
51.0 Evaluate and analyze techniques and methods of cloud deployment.
52.0 Evaluate the risks of cloud-based systems.
53.0 Demonstrate an awareness of cloud implementation.
54.0 Demonstrate an understanding of virtualization concepts.
55.0 Install and configure the virtualization server platform.
56.0 Install, configure and manage virtualized clients.
57.0 Demonstrate proficiency in managing a virtualization infrastructure.
58.0 Demonstrate an understanding of storage technologies and storage configuration.
59.0 Demonstrate proficiency in network optimization using network protocols, ports, and topologies.
60.0 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**	
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 in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environments.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines, and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present/communicate data in understandable and measurable terms using common statistical procedures.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

	12.09 Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
	13.01 Identify elements of a Web page.
	13.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
	13.03 Define basic HTML terminology.
	13.04 Analyze HTML source code developed by others.
	13.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
	13.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
	13.07 Edit and test HTML documents for accuracy and validity.
	13.08 Use basic functions of WYSIWYG editors.
	13.09 Use basic functions of HTML, DHTML, and XML editors and converters.
	13.10 Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
	14.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
	14.02 Describe and apply color theory as it applies to Web page design (e.g., background, text color).
	14.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	14.04 Use image design software to create and edit images.
	14.05 Demonstrate proficiency in publishing to the Internet.
	14.06 Demonstrate proficiency in adding downloadable forms to web pages.
	14.07 Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
	15.01 Compare and contrast various methods of evaluation for emerging technologies.
	15.02 Demonstrate knowledge of the process of planning upgrades and changeovers.
	15.03 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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, Unix/Linux).

Course Number: EEV0504 Occupational Completion Point – B Computer Support Assistant – 150 Hours – SOC Code 15-1151	
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).
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 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 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.
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 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: CTS0026 **Occupational Completion Point – C** **Network Support Technician – 150 Hours – SOC Code 15-1142**	
29.0	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:
	29.01 Develop diplomatic methods to communicate with customers.
30.0	Participate in work-based learning experiences. – The student will be able to:
	30.01 Participate in work-based learning experiences in a network support services environment.
	30.02 Discuss the use of technology in a network environment.
31.0	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:
	31.01 Apply first response assistance for minor repair work.
32.0	Perform installation and configuration activities. – The student will be able to:
	32.01 Configure the operating system environment.
	32.02 Connect client workstation running similar operating system to the network.
	32.03 Configure Internet access for a network.
	32.04 Configure a Web server.
	32.05 Use remote server to deploy operating system.
	32.06 Troubleshoot failed installations.
	32.07 Install and configure network services for interoperability.
	32.08 Monitor, configure, troubleshoot and control access to printers.
	32.09 Monitor, configure, troubleshoot and control access to files, folders, and shared folders.
	32.10 Monitor, configure, troubleshoot and control access to Web sites.
33.0	Demonstrate proficiency using computer networks. – The student will be able to:
	33.01 Identify and describe the purpose of standards; protocols; and the Open Systems Interconnection (ISO) reference model.
34.0	Demonstrate proficiency in configuring and troubleshooting hardware devices and drivers. – The student will be able to:
	34.01 Configure hardware devices.

	34.02 Configure driver signing options.
	34.03 Update device drivers.
	34.04 Troubleshoot problems with hardware.
35.0	Demonstrate proficiency in managing, monitoring, and optimizing system performance, reliability and availability. – The student will be able to:
	35.01 Monitor and optimize usage of system resources.
	35.02 Manage processes.
	35.03 Optimize disk performance.
	35.04 Manage and optimize availability of system data and user data.
	35.05 Recover systems and user data.
36.0	Demonstrate proficiency in managing, configuring and troubleshooting storage use. – The student will be able to:
	36.01 Configure and manage user profiles.
	36.02 Monitor, configure and troubleshoot disks and volumes.
	36.03 Configure data compression.
	36.04 Monitor and configure disk quotas.
	36.05 Recover from disk failures.
37.0	Demonstrate proficiency in configuring and troubleshooting network connections. – The student will be able to:
	37.01 Install, configure and troubleshoot shared access.
	37.02 Install, configure and troubleshoot a virtual private network.
	37.03 Install, configure and troubleshoot network protocols.
	37.04 Install and configure network services.
	37.05 Configure, monitor and troubleshoot remote access.
	37.06 Install, configure, monitor and troubleshoot Terminal Services.
	37.07 Configure the properties of a connection.
	37.08 Install, configure and troubleshoot network adapters and drivers.

38.0	Demonstrate proficiency in implementing, monitoring, and troubleshooting security. – The student will be able to:
	38.01 Encrypt data on a hard disk by using Encrypting File System.
	38.02 Implement, configure, manage and troubleshoot policies in an operating system environment.
	38.03 Implement, configure, manage and troubleshoot auditing.
	38.04 Implement, configure, manage and troubleshoot local accounts.
	38.05 Implement, configure, manage and troubleshoot account policy.
	38.06 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**	
39.0	Evaluate an analyze cloud principles used in cloud computing. – The student will be able to:
	39.01 Demonstrate and understanding of the evolution of cloud computing.
	39.02 Compare and contrast drivers and limitations of cloud computing.
	39.03 Compare and contrast the four main deployment models for cloud computing, public, private, community, and hybrid.
	39.04 Describe the three main service models for cloud computing (SaaS,Paas, and Oaas).
	39.05 Describe the role of the Internet and virtualization in cloud computing.
	39.06 Understand and identify managed services in cloud computing.
40.0	Identify the components of cloud based services. – The student will be able to:
	40.01 Demonstrate proficiency in accessing web applications through web browser.
	40.02 Describe, identify and use thin clients to complete business tasks.
	40.03 Describe, identify and use thick clients to complete business tasks.
	40.04 Describe, identify and use mobile clients to complete business tasks.
	40.05 Demonstrate an awareness application hosting.
	40.06 Demonstrate an awareness of multipurpose architecture.
41.0	Evaluate cloud based services. – The student will be able to:
	41.01 Perform calculations to identify the costs and saving of different cloud based models for an organization.
	41.02 The students will able to compare and contrast cloud based services used in industry.
	41.03 Identify the impacts to current and future staffing and operational needs.
	41.04 Evaluate performance of cloud-based solutions using performance indicators.
42.0	Use cloud-based services. – The student will be able to:
	42.01 Compare and contrast outsourcing and cloud computing as alternatives for business.
	42.02 Identify and use cloud based services to improve productivity.

42.03	Compare and contrast cloud based services for consumer and business.
42.04	Use cloud based services to perform collaboration online.
42.05	Demonstrate an awareness of the user experience in using a cloud-based service as compared to traditional business model.
43.0	Evaluate and analyze techniques and methods of cloud deployment. – The student will be able to:
43.01	Demonstrate an awareness of networking for cloud-based solutions.
43.02	Demonstrate an awareness of the role of automation and self-service in regard to cloud-based solutions.
43.03	Demonstrate an awareness of deployment and management of internal and external cloud services to complete business task.
43.04	Demonstrate an awareness of the role standardization in cloud-based solutions.
43.05	Demonstrate the impact of time to market, distribution over the Internet in cloud deployment.
44.0	Evaluate the risks of cloud-based systems. – The student will be able to:
44.01	Identify and evaluate compliance risks relating to software and vendors in cloud-based systems.
44.02	Demonstrate an understanding of user privacy rights and privacy risks in cloud-based systems.
44.03	Demonstrate an understanding of legal risks in cloud based systems.
44.04	Understand the role of vendors and dependencies in cloud-based solutions.
44.05	Demonstrate an understating of the risks of hardware independence.
44.06	Identify the main aspects of identity management.
45.0	Demonstrate an awareness of cloud implementation. – The student will be able to:
45.01	Describe the use of a Virtual Private network access to Local Area Network.
45.02	Describe the risk of connecting a local cloud network to the public Internet.
45.03	Identify and describe the components of cloud environment.
45.04	Demonstrate an understanding of networking topologies in cloud environment.
45.05	Demonstrate an understanding of serves, switches, and routers in cloud-based architecture.
45.06	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**
46.0 Demonstrate an understanding of virtualization concepts. – The student will be able to:
46.01 Demonstrate an understanding of the role of the virtual CPU in virtualization.
46.02 Demonstrate an understanding of the role of virtual memory in virtual component.
46.03 Demonstrate an understanding of system patching for virtual environment.
46.04 Demonstrate an understanding of virtual desktops.
46.05 Evaluate the components of networking topology including (servers, network, storage).
46.06 Compare and contrast traditional desktops and servers to virtual counterpart.
46.07 Demonstrate an understanding of the hardware requirements to create and scale a virtual infrastructure.
46.08 Demonstrate the differences between traditional virtualization and para-virtualization.
46.09 Identify, describe and use guest operating system in a virtualization environment.
46.10 Identify, define and use virtual machine monitor in virtual environment.
46.11 Perform virtual partitioning through the Hypervision.
46.12 Demonstrate an awareness of the bare metal approach for virtualization portioning.
46.13 Demonstrate an awareness of hosted virtualization as a virtualization approach.
46.14 Understand and use industry standards for hardware support for virtualization.
46.15 Demonstrate an understanding of high-level language virtual machines.
46.16 Describe the benefits of server consolidation and containment acquired through migration to virtualization.
46.17 Describe the benefits of test and development optimization gained through virtualization.
46.18 Demonstrate how virtualization reduces cost and complexity of high availability and disaster recovery.
46.19 Demonstrate how virtualization can enhance security in the enterprise.
47.0 Install and configure the virtualization server platform. – The student will be able to:
47.01 Demonstrate an understanding of a virtual image and compare that to a golden image.

47.02	Create a virtual image using a virtualization platform using a base operating system.
47.03	Create a virtual template in which the golden image is configured with the software packages and application.
47.04	Configure the virtual template to ensure software settings and organizational polices are implemented.
47.05	Manage inventory objects licenses using the virtual infrastructure ensure to comply with enterprise requirements.
47.06	Demonstrate how a virtual switch is used to create communication between virtual machines.
47.07	Perform communication between two virtual machines through the use of a virtual switch.
47.08	Create, manage and configure virtual switches to enable communication of virtual machines in different hosts.
47.09	Use virtual system management to remotely manage the allocation in a virtual network.
47.10	Perform and manage user roles and permission in a virtual environment.
47.11	Perform server patching on a virtual environment both on traditional servers as well virtual servers.
47.12	Create a patching baseline.
48.0	Install, configure and manage virtualized clients. – The student will be able to:
48.01	Demonstrate an awareness of peripheral redirection.
48.02	Demonstrate proficiency in configuring virtual client to enable both USB and monitor redirection.
48.03	Compare and contrast the use of peripherals in a traditional and virtual environment.
48.04	Demonstrate an understanding of the types of virtual clients used in a virtualization infrastructure.
48.05	Demonstrate proficiency in performing tasks using thin, thick and mobile virtualization clients.
48.06	Compare and contrast the performance, ease of use and efficiency of different clients in completing business tasks.
48.07	Analyze business tasks that are better aligned to a particular virtualization client type.
48.08	Demonstrate proficiency in managing user sessions and policies of virtual clients.
49.0	Demonstrate proficiency in managing a virtualization infrastructure. – The student will be able to:
49.01	Demonstrate an understanding of the process of cloning virtual machines.
49.02	Identify the benefits of cloning in a virtual infrastructure.
49.03	Compare and contrast full clones and linked clones.

49.04	Demonstrate proficiency in identifying situations in which cloning is a proper solution.
49.05	Demonstrate proficiency in deploying virtual machines using cloning.
49.06	Demonstrate an understating of virtual migration.
49.07	Demonstrate an understanding of the situational needs that require a virtual migration.
49.08	Identify the role of network bandwidth and resource allocation needed for virtual migration.
49.09	Demonstrate an understanding of automating migration to the host server.
49.10	Identify the process that migration affect virtual disk storage in particular SANS.
49.11	Demonstrate proficiency in developing action steps to execute a virtual migration.
50.0	Demonstrate an understanding of storage technologies and storage configuration. – The student will be able to:
50.01	Demonstrate an awareness of the evolution of storage architecture and data center components.
50.02	Describe, identify and use data center elements host, connectivity and storage.
50.03	Identify describe, and use RAID technology in an enterprise environment.
50.04	Identify the impact to application performance based on RAID implementation.
50.05	Demonstrate an awareness of intelligent storage system.
50.06	Compare and contrast storage systems for a virtualization infrastructure.
50.07	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).
50.08	Identify the appropriate storage network solutions based on client requirements.
50.09	Demonstrate proficiency in creating and managing data stores.
50.10	Demonstrate proficiency in configuring and managing resource pools.
51.0	Demonstrate proficiency in network optimization using network protocols, ports, and topologies. – The student will be able to:
51.01	Demonstrate an awareness of disaster recovery (business continuity) information availability for virtualized and non-virtualized environments.
51.02	Demonstrate proficiency in backup and recovery in both virtualized and non-virtualized environments.
51.03	Demonstrate an awareness of deduplication technology for backup optimization.
51.04	Demonstrate an awareness of fixed content storage requirements and archival solutions.

51.05	Demonstrate an awareness of continuous data replication and remote replication in virtualized and non-virtualized environments.
51.06	Demonstrate proficiency in integrating Active Directory to a virtual environment.
51.07	Demonstrate proficiency in CPU and memory optimization.
51.08	Demonstrate proficiency using remote desktops and display protocols to optimize network infrastructure.
51.09	Demonstrate an awareness of fault tolerance and acceptable levels tolerated based on the infrastructure.
52.0	The student will be able to understand security in a virtualized environment. – The student will be able to:
52.01	Compare and contrast hosted and Bare-Metal virtualization implementations vulnerability to threats and attacks.
52.02	Demonstrate an awareness of data leakage and malicious code intrusion.
52.03	Demonstrate proficiency in securing data between guest and host environments.
52.04	Demonstrate proficiency in managing resource allocation in a virtualized environment to reduce system crash.
52.05	Demonstrate proficiency in creating images that are secure for client deployment.
52.06	Demonstrate an awareness of software security levels and digital signatures.
52.07	Demonstrate proficiency in using, configuring and managing host firewall in a virtualized infrastructure.
52.08	Demonstrate proficiency in using command line to configure and manage the host firewall.
52.09	Demonstrate proficiency in using logging tools to monitor activity in the virtual environment.
52.10	Identify, describe and provide solutions to threats based on scalability and high availability.
52.11	Demonstrate proficiency in securing mobile, thin and thick clients.
52.12	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 the Business Technology Education Core and one occupational completion point. Students who have previously completed the Business Technology Education Core will not have to repeat the core. 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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 data storage and dangers in designing the process for storage by 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 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.
36.0 Demonstrate comprehension of aspects of SQL Language interface by writing basic SQL statements.
37.0 Demonstrate proficiency working with columns, characters, and rows in SQL.
38.0 Demonstrate proficiency in using SQL comparison operators.
39.0 Demonstrate proficiency in using logical comparisons and precedence rules.
40.0 Demonstrate proficiency using SQL single row functions.
41.0 Demonstrate proficiency displaying data from multiple tables.
42.0 Demonstrate proficiency aggregating data using group functions.
43.0 Demonstrate proficiency utilizing subqueries.
44.0 Demonstrate proficiency producing readable output with SQL language interface and reporting tool and manipulating data.
45.0 Demonstrate proficiency creating and managing database objects.
46.0 Demonstrate proficiency altering tables and constraints implementing views.
47.0 Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects.
48.0 Demonstrate ability to control user access and SQL language interface and reporting tool.
49.0 Demonstrate comprehension of bundling features of SQL.
50.0 Demonstrate comprehension working with composite data types by writing executable script files.
51.0 Demonstrate language arts knowledge and skills.
52.0 Demonstrate mathematics knowledge and skills.
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, inter-organizational 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

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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

	12.09 Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
	13.01 Identify elements of a Web page.
	13.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
	13.03 Define basic HTML terminology.
	13.04 Analyze HTML source code developed by others.
	13.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
	13.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
	13.07 Edit and test HTML documents for accuracy and validity.
	13.08 Use basic functions of WYSIWYG editors.
	13.09 Use basic functions of HTML, DHTML and XML editors and converters.
	13.10 Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
	14.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
	14.02 Describe and apply color theory as it applies to Web page design (e.g., background, text color).
	14.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	14.04 Use image design software to create and edit images.
	14.05 Demonstrate proficiency in publishing to the Internet.
	14.06 Demonstrate proficiency in adding downloadable forms to web pages.
	14.07 Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
	15.01 Compare and contrast various methods of evaluation for emerging technologies.
	15.02 Demonstrate knowledge of the process of planning upgrades and changeovers.
	15.03 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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, Unix/Linux).

Course Number: CTS0046 **Occupational Completion Point: A** **Database Fundamentals – 150 Hours – SOC Code 15-1141**	
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.
18.02	Describe the role a database plays in a business and predict its evolution.
18.03	Demonstrate the difference between "data" and "information."
18.04	Understand the importance of clear communication when discussing business informational requirements.
18.05	Identify important historical contributions in database development and design.
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:
19.01	Identify and analyze the phases of the database development process.
19.02	Explain what conceptual data modeling and database design involve.
19.03	Compare database development Process with that of the application development process.
19.04	Distinguish between a conceptual model and a physical implementation.
20.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:
20.01	Identify and model various types of entities.
20.02	Identify naming and drawing conventions for entities.
20.03	Sequence the steps that are necessary for creation of an entity.
20.04	Analyze and model the relationships between entities.
21.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:
21.01	Analyze and model attributes.
21.02	Identify unique identifiers for each entity.
21.03	Develop an entity relationship diagram tagging attributes with optionality.
22.0	Consider the degree and optionality of relationships of entities. – The student will be able to:
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.
	22.03 Identify relationship between two entities by reading a given diagram.
	22.04 Create a relationship between instances of the same entity.
	22.05 Read an entity relationship model in order to validate it.
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:
	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.
	23.03 Recognize unique identifiers inherited from other entities.
	23.04 Sequence the steps involved in resolving a many-to-many relationship.
24.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:
	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.
	24.03 Model advanced data constructs including recursive relationships, subtypes and exclusive relationships.
	24.04 Create exclusive entities and relationships by using subtypes and arcs, respectively.
	24.05 Identify initial layout for presentation and generate a list of action items for members of group.
	24.06 Develop an entity relationship model using subtypes, super-types and an exclusive arc.
25.0	Demonstrate proficiency in designing and adding complexity to an Entity. – Relationship Model (ERM)–The student will be able to:
	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.
	25.03 Recognize and resolve fan traps and chasm traps.
	25.04 Differentiate between transferable and non-transferable relationships.
	25.05 Deliver a professional, formal business style presentation.
	25.06 Evaluate and critique presentation layout, design and performance.
	25.07 Construct a model using both recursion and hierarchies to express the same conceptual meaning.

	25.08 Distinguish between using date as an attribute and DAY as an entity.
26.0	Apply complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:
	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.
	26.03 Describe what data integrity refers to and list some constraints.
	26.04 Explain how database design fits into the database development process.
	26.05 Translate an entity-relationship model into a relational database design.
	26.06 Document a database design using table instance charts.
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:
	27.01 Demonstrate ability to implement six steps for mapping entity relationship models.
	27.02 Document an initial database design on table instance charts.
	27.03 Recognize raw data and evaluate the steps for creating a data group in unnormalized form (UNF).
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:
	28.01 Differentiate between unnormalized data and normalized.
	28.02 Move data from an unnormalized form through to a third normal form.
	28.03 Demonstrate ability to test data groups for third normal form compliance.
	28.04 Identify optimized data groups from given groups of normalized data.
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:
	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.
	29.03 Place tables in third normal form.
	29.04 Explain how conceptual data modeling rules ensure normalized tables.
	29.05 Specify referential integrity constraints and design indices.

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:
	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.
	30.03 Evaluate existing web sites and determine quality of design.
31.0	Extend the ERM presentation model by normalizing the data and mapping the management system. – The student will be able to:
	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 (TNF).
	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.
32.0	Apply techniques for building a storage management system by creating a website using templates and wizards. – The student will be able to:
	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.
	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:
	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.
34.0	Demonstrate comprehension of database modeling competency through group presentation. – The student will be able to:
	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.
	34.03 Self-assess learning experience through the presentation and demonstration of their final database project.
35.0	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:
	35.01 Identify the structural elements of a relational database table.
	35.02 List and describe the system development life cycle.

	35.03 Describe the industry implementation of the relational database management system (RDBMS) and object relational database management system (ORDBMS).
	35.04 Explain how SQL and languages that extend SQL are used in the industry product set.
	35.05 Identify the advantages of a database management system.
36.0	Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements. – The student will be able to:
	36.01 List the capabilities of SQL SELECT statements.
	36.02 Execute a basic select statement.
	36.03 Differentiate between SQL statements and language commands that extend SQL.
37.0	Demonstrate proficiency working with columns, characters, and rows in SQL. – The student will be able to:
	37.01 Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.
	37.02 Use column aliases to rename columns in the query result.
	37.03 Eliminate duplicate rows in the query result.
	37.04 Display the structure of a table.
	37.05 Apply SQL syntax to restrict the rows returned from a query.
	37.06 Demonstrate application of the WHERE clause syntax.
	37.07 Construct and produce output using a SQL query containing character strings and date values.
38.0	Demonstrate proficiency in using SQL comparison operators. – The student will be able to:
	38.01 Apply the proper comparison operator to return a desired result.
	38.02 Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result.
	38.03 Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable.
	38.04 Explain the use of comparison conditions and NULL.
39.0	Demonstrate proficiency in using logical comparisons and precedence rules. – The student will be able to:
	39.01 Evaluate logical comparisons to restrict the rows returned based on two or more conditions.
	39.02 Apply the rules of precedence to determine the order in which expressions are evaluated and calculated.
	39.03 Construct a query to order a results set for single or multiple columns.

	39.04 Construct a query to sort a results set in ascending or descending order.
40.0	Demonstrate proficiency using SQL single row functions. – The student will be able to:
	40.01 Perform calculations on data.
	40.02 Modify individual data items.
	40.03 Use character, number and date functions in SELECT statements.
	40.04 Format data and numbers for display purposes.
	40.05 Convert column data types.
41.0	Demonstrate proficiency displaying data from multiple tables. – The student will be able to:
	41.01 Construct select statements to access data from more than one table using quality and non-equality joins.
	41.02 Use outer joins through viewing data that generally does not meet a join condition.
	41.03 Join a table to itself.
42.0	Demonstrate proficiency aggregating data using group functions. – The student will be able to:
	42.01 Identify the available group functions and describe their use.
	42.02 Demonstrate the ability to group data through the use of the GROUP BY clause.
	42.03 Demonstrate the ability to include or exclude grouped rows by using the HAVING clause.
43.0	Demonstrate proficiency utilizing subqueries. – The student will be able to:
	43.01 Write a query with an embedded subquery.
	43.02 Evaluate and perform a multiple-column subquery.
	43.03 Describe and explain the behavior of subqueries when null values are retrieved.
	43.04 Create a subquery in a FROM clause.
44.0	Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language. – The student will be able to:
	44.01 Produce queries that require an input variable.
	44.02 Customize the SQL language interface and reporting environment using SET commands for control.
	44.03 Produce more readable output through the use of the column and break commands.

	44.04 Describe data manipulation language (DML) and describe various DML statements.
	44.05 Utilize data manipulation language (DML) through inserting, updating and deleting rows from a table.
	44.06 Control transactions using COMMIT and ROLLBACK statements.
45.0	Demonstrate proficiency creating and managing database objects. – The student will be able to:
	45.01 Describe the main database objects.
	45.02 Create tables and alter their definitions.
	45.03 Describe the data types that can be used when specifying column definition.
46.0	Demonstrate proficiency altering tables and constraints implementing views. – The student will be able to:
	46.01 Create, drop, rename and truncate tables using SQL.
	46.02 Identify and describe various constraints including not null, unique, primary key, foreign key, and check.
	46.03 Create and maintain constraints including adding, dropping, enabling, disabling, and cascading.
	46.04 Recognize views and explain how they are created, how they retrieve data and how they perform DML operations.
47.0	Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects. – The student will be able to:
	47.01 Create views, retrieve data through a view, alter the definition of a view and drop a view.
	47.02 Categorize information by using Top-N queries to retrieve specified data.
	47.03 Identify the features of a sequence and display sequence values using a data dictionary view.
	47.04 Identify the characteristics of a cached sequence.
	47.05 Modify and remove a sequence using a SQL statement.
	47.06 Identify the features of private and public synonyms.
	47.07 Identify characteristics of an index and describe different types.
	47.08 Create and remove an index using a SQL statement.
48.0	Demonstrate ability to control user access and SQL language interface and reporting tool. – The student will be able to:
	48.01 Identify the features of database security.
	48.02 Create users using SQL statements.

	48.03 Grant and revoke object privileges using a SQL language interface and reporting tool.
49.0	Demonstrate comprehension of bundling features of SQL. – The student will be able to:
	49.01 List and describe the benefits of extensions to SQL.
	49.02 Recognize the basic SQL block and its sections.
	49.03 Declare SQL variables and describe their significance.
	49.04 Execute a SQL block.
50.0	Demonstrate comprehension working with composite data types by writing executable script files. – The student will be able to:
	50.01 Recognize the significance of the executable section and decide when to use it.
	50.02 Write statements in the executable section.
	50.03 Describe the rules of nested blocks.
	50.04 Identify and utilize appropriate coding conventions.
	50.05 Create a script that will select, insert, and update data in a table.
51.0	Demonstrate language arts knowledge and skills. – The student will be able to:
	51.01 Locate, comprehend and evaluate key elements of oral and written information.
	51.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
	51.03 Present information formally and informally for specific purposes and audiences.
52.0	Demonstrate mathematics knowledge and skills. – The student will be able to:
	52.01 Demonstrate knowledge of arithmetic operations.
	52.02 Analyze and apply data and measurements to solve problems and interpret documents.
	52.03 Construct charts/tables/graphs using functions and data.

Course Number: CTS0047 **Occupational Completion Point: A** **Specialized Database Programming – 150 Hours – SOC Code 15-1141**	
53.0	Describe the differences between SQL and PL/SQL–The student will be able to:
	53.01 Describe PL/SQL.
	53.02 Differentiate between SQL and PL/SQL.
	53.03 Explain the need for and benefits of PL/SQL.
54.0	Create PL/SQL blocks. – The student will be able to:
	54.01 Describe the structure of a PL/SQL block.
	54.02 Identify the different types of PL/SQL blocks.
	54.03 Identify PL/SQL programming environments.
	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.
	55.02 Identify the syntax for using variables.
	55.03 Declare and initialize variables.
	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.
	56.02 Describe identifiers and identify valid and invalid identifiers.
	56.03 Describe and identify reserved words, delimiters, literals, and comments.
57.0	Recognize data types. – The student will be able to:
	57.01 Describe the data type categories.
	57.02 Give examples of scalar, composite, and large object (LOB) data types.

	57.03 Identify when an object becomes eligible for garbage collection.
58.0	Use scalar data types. – The student will be able to:
	58.01 Declare and use scalar data types.
	58.02 Define guidelines for declaring and initializing variables.
	58.03 Describe the benefits of anchoring data types with the %TYPE attribute.
59.0	Use various types of JOINS. – The student will be able to:
	59.01 Construct and execute SELECT statements using an equijoin.
	59.02 Construct and execute SELECT statements using a non-equijoin.
	59.03 Construct and execute SELECT statements using an outer join.
	59.04 Construct and execute SELECT statements that result in a Cartesian product.
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.
	60.02 Construct and execute an SQL query that groups data based on specified criteria.
	60.03 Construct and execute an SQL query that contains a WHERE clause using a single-row subquery.
	60.04 Construct and execute an SQL query that contains a WHERE clause using a multiple-row subquery.
61.0	Write PL/SQL executable statements. – The student will be able to:
	61.01 Construct variable assignment statements.
	61.02 Construct statements using built-in SQL functions.
	61.03 Differentiate between implicit and explicit data type conversions.
	61.04 Describe when implicit data type conversions take place.
	61.05 List the drawbacks of implicit data type conversions.
	61.06 Construct statements using functions to explicitly convert data types.
	61.07 Construct statements using operators.
62.0	Use nested blocks and variable scope. – The student will be able to:

	62.01 Understand the scope and visibility of variables.
	62.02 Write nested blocks and qualify variables with labels.
	62.03 Describe the scope of an exception.
	62.04 Describe the effect of exception propagation in nested blocks.
63.0	Use good programming practices. – The student will be able to:
	63.01 List examples of good programming practices.
	63.02 Insert comments into PL/SQL code.
	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.
	64.02 Construct and execute a DML statement to update data in a table.
	64.03 Construct and execute a DML statement to delete data from a table.
	64.04 Construct and execute a DML statement to merge data into a table.
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.
	65.02 Construct and execute an INTO clause to hold values returned by a single-row SELECT statement.
	65.03 Construct statements that retrieve data.
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.
	66.02 Describe when to use implicit or explicit cursors.
	66.03 Create code to use SQL implicit cursor attributes to evaluate cursor activity.
67.0	Use transaction control statements. – The student will be able to:
	67.01 Define a transaction and give an example.
	67.02 Construct and execute a transaction control statement.

68.0	Use IF conditional control statements. – The student will be able to:
	68.01 Construct and use an IF statement.
	68.02 Construct and use an IF-THEN-ELSIF-ELSE statement.
	68.03 Create PL/SQL to handle null conditions in an IF statement.
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.
	69.03 Include syntax to handle null conditions in a CASE statement.
	69.04 Include syntax to handle Boolean conditions in IF and CASE statements.
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.
	70.02 Create PL/SQL containing a basic loop and an EXIT statement.
	70.03 Create PL/SQL containing a basic loop and an EXIT statement with conditional termination.
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.
	71.03 Describe when a WHILE loop is used.
	71.04 Describe when a FOR loop is used.
72.0	Use nested loop iterative control statements. – The student will be able to:
	72.01 Construct and execute PL/SQL using nested loops.
	72.02 Evaluate a nested loop construct and identify the exit point.
73.0	Use explicit cursors. – The student will be able to:
	73.01 List the guidelines for declaring and controlling explicit cursors.
	73.02 Create PL/SQL code to open a cursor and fetch a piece of data into a variable.

	73.03 Use a simple loop to fetch multiple rows from a cursor.
	73.04 Create PL/SQL code to close a cursor.
74.0	Use explicit cursor attributes. – The student will be able to:
	74.01 Define a record structure using the %ROWTYPE attribute.
	74.02 Create PL/SQL code to process the row of an active set using record types in cursors.
	74.03 Use cursor attributes to retrieve information about the state of an explicit cursor.
75.0	Use cursor FOR loops. – The student will be able to:
	75.01 List and explain the benefits of using Cursor FOR loops.
	75.02 Create PL/SQL code to declare a cursor and manipulate it in a FOR loop.
	75.03 Create PL/SQL code containing a Cursor FOR loop using a subquery.
76.0	Use cursors with parameters. – The student will be able to:
	76.01 List the benefits of using parameters with cursors.
	76.02 Create PL/SQL code to declare and manipulate a cursor with a parameter.
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.
	77.02 Explain the effect of using NOWAIT in an update cursor declaration.
	77.03 Create PL/SQL code to use the current row of the cursor in an UPDATE or DELETE statement.
78.0	Use multiple cursors. – The student will be able to:
	78.01 Explain the need for using multiple cursors to produce multilevel reports.
	78.02 Create PL/SQL code to declare and manipulate multiple cursors within nested loops.
	78.03 Create PL/SQL code to declare and manipulate multiple cursors using parameters.
79.0	Handle exceptions. – The student will be able to:
	79.01 Describe the advantages of including exception handling code.
	79.02 Describe the purpose of an EXCEPTION section in a PL/SQL block.

	79.03 Create PL/SQL code to include an EXCEPTION section.
	79.04 List the guidelines for exception handling.
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.
	80.02 Differentiate between errors that are handled implicitly and explicitly by the Oracle Server.
	80.03 Write PL/SQL code to trap a predefined Oracle Server error.
	80.04 Write PL/SQL code to trap a non-predefined Oracle Server error.
	80.05 Write PL/SQL code to identify an exception by error code and by error message.
81.0	Trap user-defined exceptions. – The student will be able to:
	81.01 Write PL/SQL code to name a user-defined exception.
	81.02 Write PL/SQL code to raise an exception.
	81.03 Write PL/SQL code to handle a raised exception.
	81.04 Write PL/SQL code to use RAISE_APPLICATION_ERROR.
82.0	Create procedures. – The student will be able to:
	82.01 Differentiate between anonymous blocks and subprograms.
	82.02 Identify the benefits of using subprograms.
	82.03 Describe a stored procedure.
	82.04 Create a procedure.
	82.05 Describe how a stored procedure is invoked.
83.0	Use parameters in procedures. – The student will be able to:
	83.01 Describe how parameters contribute to a procedure.
	83.02 Define a parameter.
	83.03 Create a procedure using a parameter.
	83.04 Invoke a procedure that has parameters.

	83.05 Distinguish between formal and actual parameters.
84.0	Pass parameters. – The student will be able to:
	84.01 List the types of parameter modes.
	84.02 Create a procedure that passes parameters.
	84.03 Identify three methods for passing parameters.
	84.04 Describe the DEFAULT option for parameters.
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.
	85.03 Identify ways in which functions may be invoked.
	85.04 Create a PL/SQL block that invokes a function that has parameters.
86.0	Use functions in SQL statements. – The student will be able to:
	86.01 Describe where user-defined functions can be called from within an SQL statement.
	86.02 Describe the restrictions on calling functions from SQL statements.
	86.03 Describe the purpose of the Data Dictionary.
	86.04 Differentiate between the three types of Data Dictionary views.
	86.05 Write SQL SELECT statements to retrieve information from the Data Dictionary.
	86.06 Explain the use of DICTIONARY as a Data Dictionary search engine.
87.0	Manage procedures and functions. – The student will be able to:
	87.01 Describe how exceptions are propagated.
	87.02 Remove a function and a procedure.
	87.03 Use Data Dictionary views to identify and manage stored procedures.
88.0	Manage object privileges. – The student will be able to:
	88.01 List and explain several object privileges.

	88.02 Explain the function of the EXECUTE object privilege.
	88.03 Write SQL statements to grant and revoke object privileges.
89.0	Use invoker's rights. – The student will be able to:
	89.01 Contrast invoker's rights with definer's rights.
	89.02 Create a procedure that uses invoker's rights.
90.0	Create packages. – The student will be able to:
	90.01 Describe a package, its components, and the reasons for use.
	90.02 Create packages containing related variables, cursors, constants, exceptions, procedures, and functions.
	90.03 Create a PL/SQL block that invokes a package construct.
91.0	Manage package constructs. – The student will be able to:
	91.01 Explain the difference between public and private package constructs.
	91.02 Designate a package construct as either public or private.
	91.03 Specify the syntax to drop a package.
	91.04 Identify Data Dictionary views used to manage packages.
	91.05 Identify the guidelines for using packages.
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.
	92.04 Identify restrictions on using packaged functions in SQL statements.
93.0	Manage persistent state of package variables. – The student will be able to:
	93.01 Identify persistent states of package variables.
	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.
	94.02 Use the syntax to specify messages for the DBMS_OUTPUT package.
	94.03 Describe the purpose for the UTL_FILE package.
	94.04 Identify the exceptions used in conjunction with the UTL_FILE package.
95.0	Understand dynamic SQL. – The student will be able to:
	95.01 Identify the stages through which all SQL statements pass.
	95.02 Describe the reasons for using dynamic SQL to create an SQL statement.
	95.03 List four PL/SQL statements supporting Native Dynamic SQL.
	95.04 Describe the benefits of Execute Immediate over DBMS_SQL for Dynamic SQL.
96.0	Understand triggers. – The student will be able to:
	96.01 Describe database triggers and their uses.
	96.02 Differentiate between a database trigger and an application trigger.
	96.03 List the guidelines for using triggers.
	96.04 Compare and contrast database triggers and stored procedures.
97.0	Create DML triggers. – The student will be able to:
	97.01 Create a DML trigger and identify its components.
	97.02 Create a statement level trigger.
	97.03 Describe the trigger firing sequence options.
	97.04 Create a DML trigger that uses conditional predicates.
	97.05 Create a row level trigger.
	97.06 Create a row level trigger that uses OLD and NEW qualifiers.
	97.07 Create an INSTEAD OF trigger.
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.

	98.02 Create a trigger for a DDL statement.
	98.03 Create a trigger for a database event.
	98.04 Describe the functionality of the CALL statement.
	98.05 Describe the cause of a mutating table.
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.
	100.02 Describe LOB data types and how they are used.
	100.03 Differentiate between internal and external LOBs.
	100.04 Create and maintain LOB data types.
	100.05 Migrate data from LONG to LOB.
101.0	Manage BFILEs. – The student will be able to:
	101.01 Define BFILEs and the BFILE column data type.
	101.02 Create directory objects and view them in the Data Dictionary.
	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.
	102.02 Create an INDEX BY table.
	102.03 Create an INDEX BY table of records.
	102.04 Describe the difference between records, tables, and tables of records.
103.0	Manage dependencies. – The student will be able to:

103.01	Describe the implications of procedural dependencies.
103.02	Contrast dependent objects and referenced objects.
103.03	View dependency information in the Data Dictionary.
103.04	Use the UTLDTREE script to create the objects required to display dependencies.
103.05	Use the IDEPTREE and DEPTREE views to display dependencies.
103.06	Describe when automatic recompilation occurs.
103.07	Describe how to minimize dependency failures.
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.
104.02	Locate, organize and reference written information from various sources.
104.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
104.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.
104.05	Apply active listening skills to obtain and clarify information.
104.06	Develop and interpret tables and charts to support written and oral communications.
104.07	Exhibit public relations skills that aid in achieving customer satisfaction.
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.
105.02	Employ critical thinking and interpersonal skills to resolve conflicts.
105.03	Identify and document workplace performance goals and monitor progress toward those goals.
105.04	Conduct technical research to gather information necessary for decision-making.
106.0	Use information technology tools. – The student will be able to:
106.01	Use personal information management (PIM) applications to increase workplace efficiency.
106.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
106.03	Employ computer operations applications to access, create, manage, integrate, and store information.

	106.04 Employ collaborative/groupware applications to facilitate group work.
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.
	107.02 Explain the effect of key organizational systems on performance and quality.
	107.03 List and describe quality control systems and/or practices common to the workplace.
	107.04 Explain the impact of the global economy on business organizations.
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.
	108.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	108.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	108.04 Interpret and explain written organizational policies and procedures.

Course Number: CTS0067 **Occupational Completion Point: A** **Specialized Database Applications – 150 Hours – SOC Code 15-1141**
109.0 Program a database application. – The student will be able to:
109.01 Utilize loop statements.
109.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
109.03 Create user-defined functions.
109.04 Utilize common built-in functions.
109.05 Declare variables in modules and procedures.
109.06 Declare arrays, and initialize elements of arrays.
109.07 Declare and use object variables and collections, and use their associated properties and methods.
109.08 Declare symbolic constants, and make them available locally or publicly.
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:
111.01 Utilize SQL to write common queries.
111.02 Refer to objects by using SQL.
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.
112.03 Write statements that access and modify database objects.
112.04 Utilize data access objects.

	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:
	113.01 Trap errors.
	113.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.
	113.03 Debug code samples.
	113.04 Utilize the Debugger to monitor variable values.
	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:
	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.
	115.04 Define and create form and report modules.
	115.05 Identify the scope of a form or report module.
	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.
	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.
	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.
	119.03 Explain the purpose of the Replication ID.
	119.04 Explain how synchronization conflicts are resolved.
	119.05 Identify the advantages of using replication of synchronization.
	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:
	120.01 Analyze a scenario, and recommend an appropriate type of security.
	120.02 Explain the steps for implementing security.
	120.03 Analyze code to ensure that it sets security options.
	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.
	121.03 Trap errors that are generated by the server.
	121.04 Optimize connections.
	121.05 Optimize performance for a given client/server application.

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.
	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:
	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.
	125.03 Create a disaster and/or emergency response plan.
126.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	126.01 Employ leadership skills to accomplish organizational goals and objectives.
	126.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	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:

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.

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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Explain motherboard components, types and features.
26.0 Explain the purpose and characteristics of CPUs and their features.
27.0 Perform installation and configuration activities.
28.0 Demonstrate proficiency using computer networks.
29.0 Perform the process for problem diagnostics and problem resolution through wireless, infrared, telephone, e-mail, remote access, or direct contact.
30.0 Demonstrate knowledge of presentation production issues.
31.0 Demonstrate proficiency using computer networks.
32.0 Demonstrate proficiency communicating over the Internet.
33.0 Demonstrate proficiency in troubleshooting, repair and maintenance of computers.

34.0 Demonstrate proficiency in the basic principles of security concepts and technologies.
35.0 Demonstrate proficiency in operational procedures as they relate to computer equipment and components.
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, inter-organizational systems, and the larger environment.
40.0 Describe the importance of professional ethics and legal responsibilities.
41.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
42.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
43.0 Develop the process of creating an entity by identifying relationships.
44.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
45.0 Consider the degree and optionality of relationships of entities.
46.0 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.
47.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
48.0 Apply the complex ERM information by fine-tuning entities and the process for relating them.
49.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
50.0 Manipulating data.
51.0 Building and modifying tables.
52.0 Performing queries and filtering records.
53.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
54.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
55.0 Explain the importance of employability skill and entrepreneurship skills.
56.0 Demonstrate personal money-management concepts, procedures, and strategies.
57.0 Plan program design.
58.0 Code programs.
59.0 Test programs.
60.0 Perform program maintenance.
61.0 Create and maintain documentation.
62.0 Develop an awareness of software quality assurance.
63.0 Develop an understanding of programming techniques and concepts.
64.0 Design structured programs.
65.0 Demonstrate proficiency in page design applicable to the WWW.
66.0 Demonstrate proficiency in web page design applicable to the WWW.
67.0 Demonstrate proficiency in using a WYSIWG editor, web design, or web animation software for web page design.
68.0 Demonstrate proficiency in using digital photography and digital imaging.
69.0 Design and create webpages suitable for publishing to the Internet.
70.0 Describe how website performance is monitored and analyzed.
71.0 Demonstrate proficiency in hosting a website.
72.0 Demonstrate the ability to attract traffic for a website.
73.0 Demonstrate knowledge of presentation production issues.

74.0 Demonstrate proficiency in using digital photography and digital imaging.
75.0 Demonstrate basic video production.
76.0 Demonstrate set-up and configuration of a computer for video applications.
77.0 Demonstrate the basic operation of a video workstation.
78.0 Demonstrate basic audio production.
79.0 Set-up and configure a computer for audio applications.
80.0 Operate an audio workstation.
81.0 Demonstrate proficiency in using presentation software and equipment.
82.0 Demonstrate understanding of network technologies.
83.0 Understand, install and configure network hardware.
84.0 Understand, install and configure networking devices.
85.0 Understand, install and configure network management software.
86.0 Understand, install and configure networking tools.
87.0 Install, configure, and manage network security hardware and software devices.
88.0 Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends.
89.0 Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk.
90.0 Recognize and be able to differentiate and explain the following access control models.
91.0 Recognize and be able to differentiate and explain the following methods of authentication.
92.0 Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk.
93.0 Recognize and understand the processes and risks associated with the following security concerns and tasks.
94.0 Recognize and understand the administration of the following types of remote access technologies.
95.0 Recognize and understand the administration of the following email security concepts.
96.0 Recognize and understand the administration of the following Internet security concepts.
97.0 Recognize and understand the administration of the following vulnerabilities.
98.0 Recognize and understand the administration of the following directory security concepts.
99.0 Recognize and understand the administration of the following file transfer protocols and concepts.
100.0 Recognize and understand the administration of the following wireless technologies and concepts.
101.0 Compare and contrast the following types of intrusion detection in terms of implementation and configuration.
102.0 Be able to identify and explain the following different kinds of cryptographic algorithms.
103.0 Understand how cryptography and digital signatures address the following security concepts.
104.0 Understand and be able to explain the following concepts of PKI (Public Key Infrastructure).
105.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

12.09	Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
13.01	Identify elements of a Web page.
13.02	Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
13.03	Define basic HTML terminology.
13.04	Analyze HTML source code developed by others.
13.05	Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
13.06	Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
13.07	Edit and test HTML documents for accuracy and validity.
13.08	Use basic functions of WYSIWYG editors.
13.09	Use basic functions of HTML, DHTML, and XML editors and converters.
13.10	Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
14.01	Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
14.02	Describe and apply color theory as it applies to Web page design (e.g., background, text color).
14.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
14.04	Use image design software to create and edit images.
14.05	Demonstrate proficiency in publishing to the Internet.
14.06	Demonstrate proficiency in adding downloadable forms to web pages.
14.07	Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
15.01	Compare and contrast various methods of evaluation for emerging technologies.
15.02	Demonstrate knowledge of the process of planning upgrades and changeovers.
15.03	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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, Unix/Linux).

Course Number: CTS0072 **Occupational Completion Point: B** **IT & Web Systems – 300 Hours – SOC Code 15-1151**	
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).
	18.02 Explain the key concepts of meeting client needs.
	18.03 Apply the principles of Human Computer Interface (HCI) to design and develop an effective look and feel for a website.
	18.04 Design and create a webpage for optimal display in multiple browsers.
19.0	Demonstrate proficiency planning an effective website. – The student will be able to:
	19.01 Compare and contrast site maps and wireframes.
	19.02 Develop an effective site map for a website.
	19.03 Create page layout wireframes for a website.
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.
	20.02 Describe the different types of business requirements that apply to website design.
	20.03 Design business requirements to help ensure success for a specific website.
	20.04 Demonstrate ability to use effective designer-client communication skills.
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.
	21.02 Design and create an effective web page template.
	21.03 Create attractive, engaging, and efficient web pages using a WYSIWYG editor.
	21.04 Create an appropriate directory structure, naming convention protocol, and file organization for a website.
	21.05 Create DHTML and XML documents using editors or converters.
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).

	22.02 Demonstrate proficiency using various specialized web design software (e.g., Flash, Photoshop, Dreamweaver).
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.
	23.02 Create effective written content for the web.
	23.03 Prepare various types of graphical content for use on a webpage.
	23.04 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	23.05 Create and edit images using image or graphic design software.
	23.06 Compare and contrast static versus dynamic web content.
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.
	24.02 List the steps that are necessary to determine when a website is ready to launch.
	24.03 Develop a User Testing Plan.
	24.04 Demonstrate the ability to organize and execute a user testing of a website.
	24.05 Demonstrate proficiency in publishing to the Internet.
25.0	Explain motherboard components, types and features. – The student will be able to:
	25.01 Identify different motherboard form factors (ATX/BTX and micro ATX).
	25.02 Identify input/output interfaces (e.g. USB, serial, NIC).
	25.03 Identify the different types of bus slots (e.g. PCI, AGP, PCMCIA).
	25.04 Identify the BIOS/CMOS/Firmware (e.g. POST, CMOS battery).
26.0	Explain the purpose and characteristics of CPUs and their features. – The student will be able to:
	26.01 Identify types of CPUs (e.g. AMD, Intel).
	26.02 Define hyper threading.
	26.03 Explain multi core (e.g. dual, triple, quad).
	26.04 Explain the difference between onboard cache (e.g. L1, L2, L3).

	26.05 Compare and contrast between real and actual speed.
	26.06 Compare and contrast between 32 bit and 64 bit processing.
27.0	Perform installation and configuration activities. – The student will be able to:
	27.01 Install and configure software including device drivers.
	27.02 Install and configure operating system software.
	27.03 Install and configure application software.
	27.04 Install and configure peripherals including device drivers (e.g., scanners, cameras, printers).
	27.05 Supervise the testing of operating system management systems (e.g., registry, INI files).
	27.06 Prepare the hard disk and related issues for operating system installation (e.g., BIOS, disk controllers).
	27.07 Format and partition the hard disk.
	27.08 Verify the proper operation of the system (e.g., physical inspection, tests, utilities).
	27.09 Compare and contrast memory technologies (e.g., RAM, ROM, virtual memory, memory management).
	27.10 Demonstrate proficiency using various memory technologies (e.g., RAM, ROM, virtual memory, memory management).
	27.11 Demonstrate proper use of user interfaces, command utilities and troubleshooting utilities.
	27.12 Explain the basics of boot sequences, methods and startup utilities.
28.0	Demonstrate proficiency using computer networks. – The student will be able to:
	28.01 Compare and contrast various implementation models (e.g., TCP/IP protocols, OSI 7, IPX, cross mapping of protocols).
	28.02 Describe an Ethernet network and the use of CSMA\CD.
29.0	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:
	29.01 Identify, troubleshoot and propose solutions for configuration problems.
	29.02 Identify, troubleshoot and propose solutions for software problems.
	29.03 Identify, troubleshoot and propose solutions for hardware malfunctions.
	29.04 Identify, troubleshoot and propose solutions for network malfunctions.
	29.05 Plan and implement a system upgrade and downgrade.

29.06	Evaluate data recovery using various techniques (e.g., MBR repair tools, rescue disks, disk image, backup).
29.07	Organize and perform system maintenance activities (e.g., management console, SNMP, system monitors, diagnostics, virus management).
29.08	Demonstrate corporate interaction proficiency (e.g., responsibility, interaction, communication).
30.0	Demonstrate knowledge of presentation production issues. – The student will be able to:
30.01	Demonstrate knowledge of copyright laws including copyright statute, disclaimers, and filing procedure.
30.02	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).
30.03	Identify display device connectors and types (e.g. VGA, HDMi, S-Video).
30.04	Define refresh rate, resolution, multi-monitor and Degauss.
30.05	Demonstrate knowledge of presentation vocabulary/terms.
30.06	Compare and contrast and utilize various audio/video output solutions and devices (e.g., DVD, CD-Rom, web).
30.07	Compare and contrast removable storage (tape drive, thumb drive, flash drive, USB, external CD-RW, external hard drive).
31.0	Demonstrate proficiency using computer networks. – The student will be able to:
31.01	Define networking and describe the purpose of a network.
31.02	Describe the conceptual background of digital networks including terminology and basics.
31.03	Describe various types of networks and the advantages and disadvantages of each (e.g. peer to peer, client/server, mainframe/terminal).
31.04	Describe the use, advantages, and disadvantages of various network media (e.g. thinnet cable, coaxial), twisted pair (cat 5), fiber optics).
31.05	Describe the function of various network devices (e.g. hub, switched hub or switch, router bridge, gateway, access points)
31.06	Describe the difference between the internet and intranet.
31.07	Compare and contrast IP Version 6 and IP Version 4.
31.08	Compare and contrast the different network types (e.g. broadband, wireless, Bluetooth, cellular).
32.0	Demonstrate proficiency communicating over the Internet. – The student will be able to:
32.01	Display understanding of how Internet Service Providers (ISP) operate and what role they play in enabling users to connect to the Internet.
32.02	Explain how the Internet works and how documents are connected and transferred.

	32.03 Configure an email client for SMTP and POP3 servers, including port assignment.
	32.04 Explain how the primary modes of Internet communication are used.
33.0	Demonstrate proficiency in troubleshooting, repair and maintenance of computers. – The student will be able to:
	33.01 Determine the troubleshooting methods and tools for printers.
	33.02 Explain and interpret common laptop issues and basic troubleshooting methods.
	33.03 Integrate common preventative maintenance techniques.
34.0	Demonstrate proficiency in the basic principles of security concepts and technologies. – The student will be able to:
	34.01 Evaluate encryption technologies, software firewall, authentication technologies, and data security.
	34.02 Summarize the following security features (e.g. wireless encryption, malicious software protection and BIOS security, password management, biometrics).
35.0	Demonstrate proficiency in operational procedures as they relate to computer equipment and components. – The student will be able to:
	35.01 Compare and contrast ESD, EMI, RFI, and electrical safety.
	35.02 Demonstrate proficiency in the use of state regulations for hazardous materials (e.g., MSDS).
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: CTS0063 **Occupational Completion Point: C** **Database Essentials – 150 Hours – SOC Code 15-1151**	
41.0	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:
41.01	Describe the role a database plays in a business and predict its evolution.
41.02	Demonstrate the difference between “data” and “information.”
41.03	Understand the importance of clear communication when discussing business informational requirements.
41.04	Experiment with web-based email and explain how these services use a database.
42.0	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:
42.01	Identify and analyze the phases of the database development process.
42.02	Explain what conceptual data modeling and database design involves.
42.03	Compare database development process with that of the application development process.
42.04	Identify the need for databases and why they are used.
42.05	Explain the various types of databases (i.e., flat file, relational) and the appropriate use of each.
42.06	Demonstrate proficiency in design methodology by completing appropriate tasks during the appropriate time of the developmental life cycle.
42.07	Demonstrate proficiency in design methodology by considering where the database will reside.
43.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:
43.01	Identify and model various types of entities.
43.02	Identify naming and drawing conventions for entities.
43.03	Sequence the steps that are necessary for creation of an entity.
43.04	Analyze and model the relationships between entities.
44.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:
44.01	Analyze and model attributes.
44.02	Identify unique identifiers for each entity.
44.03	Develop an entity relationship diagram tagging attributes with optionality.

45.0	Consider the degree and optionality of relationships of entities. – The student will be able to:
	45.01 Create models and entity relationship information requirements and interviews.
	45.02 Begin to differentiate between one-to-many, many-to-many and one-to-one relationships.
	45.03 Identify relationship between two entities by reading a given diagram.
	45.04 Create a relationship between instances of the same entity.
	45.05 Read an entity relationship model in order to validate it.
46.0	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:
	46.01 Identify the significance of an attribute that has more than one value for each entity instance.
	46.02 Evaluate appropriate methods of storing validation rules for attributes.
	46.03 Recognize unique identifiers inherited from other entities.
	46.04 Sequence the steps involved in resolving a many-to-many relationship.
47.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:
	47.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).
	47.02 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.
	47.03 Enforce referential integrity.
48.0	Apply the complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:
	48.01 Describe a relational database and how it is different from other database systems.
	48.02 Define primary keys and foreign keys and describe their purpose.
	48.03 Describe what data integrity refers to and list some constraints.
	48.04 Explain how database design fits into the database development process.
	48.05 Translate an entity-relationship model into a relational database design.
49.0	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:
	49.01 Recognize raw data and evaluate the steps for creating a data group in unnormalized form (UNF).

50.0	Manipulating data. – The student will be able to:
	50.01 Determine appropriate data inputs and outputs for an existing database.
	50.02 Demonstrate proficiency in record management (i.e., entering, editing, finding, selecting, sorting, deleting records).
	50.03 Change the layout of a datasheet.
	50.04 Create forms, reports, mailing labels, and charts using a database.
	50.05 Export data to appropriate software applications.
	50.06 Demonstrate proficiency in coordinating databases with appropriate software applications.
51.0	Building and modifying tables. – The student will be able to:
	51.01 Create a database table.
	51.02 Create table structures and establish table relationships.
	51.03 Determine fields and assign data types in a database table.
	51.04 Demonstrate appropriate manipulation of database tables (i.e., enter data, add, delete records).
	51.05 Modify a database table by adding, deleting and removing fields.
	51.06 Demonstrate proficiency in the appropriate use of database wizards.
52.0	Performing queries and filtering records. – The student will be able to:
	52.01 Design a query and extract specific data from a database table.
	52.02 Create a calculated field.
	52.03 Filter data in records by selection and by form.
	52.04 Modify a saved query.
53.0	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:
	53.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	53.02 Explain emergency procedures to follow in response to workplace accidents.
	53.03 Create a disaster and/or emergency response plan.
54.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:

54.01	Employ leadership skills to accomplish organizational goals and objectives.
54.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
54.03	Conduct and participate in meetings to accomplish work tasks.
54.04	Employ mentoring skills to inspire and teach others.
55.0	Explain the importance of employability skill and entrepreneurship skills. – The student will be able to:
55.01	Identify and demonstrate positive work behaviors needed to be employable.
55.02	Develop personal career plan that includes goals, objectives and strategies.
55.03	Examine licensing, certification and industry credentialing requirements.
55.04	Maintain a career portfolio to document knowledge, skills and experience.
55.05	Evaluate and compare employment opportunities that match career goals.
55.06	Identify and exhibit traits for retaining employment.
55.07	Identify opportunities and research requirements for career advancement.
55.08	Research the benefits of ongoing professional development.
55.09	Examine and describe entrepreneurship opportunities as a career planning option.
56.0	Demonstrate personal money-management concepts, procedures, and strategies. – The student will be able to:
56.01	Identify and describe the services and legal responsibilities of financial institutions.
56.02	Describe the effect of money management on personal and career goals.
56.03	Develop a personal budget and financial goals.
56.04	Complete financial instruments for making deposits and withdrawals.
56.05	Maintain financial records.
56.06	Read and reconcile financial statements.
56.07	Research, compare and contrast investment opportunities.

Course Number: CTSS0030 **Occupational Completion Point: D** **Programming Fundamentals – 150 Hours – SOC Code 15-1151**
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 pseudocode 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 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
57.06 Analyze problem statements.
57.07 Determine what kind of information the desired program must process.
57.08 Formulate concise descriptions of a program's task and purpose.
57.09 Formulate concise descriptions of task and purpose of a program's pieces.
57.10 Organize programs according to the problem analysis.
57.11 Recognize changes in the problem statement.
57.12 Suggest changes in the program organization.
58.0 Code programs. – The student will be able to:
58.01 Write programs according to recognized programming standards.
58.02 Write internal documentation statements as needed in the program source code.
58.03 Code programs using logical statements (e.g., If-Then-Else, Do..While).
58.04 Enter and modify source code using a program language editor.
58.05 Code routines within programs that validate input data.
58.06 Code programs using object-oriented languages (techniques).
58.07 Select the essential aspects of a problem statement.
58.08 Provide a solution to a problem.

	58.09 Find solutions to an extended problem statement.
	58.10 Utilize reference manuals and help systems.
	58.11 Use pre-defined functions within programs.
59.0	Test programs. – The student will be able to:
	59.01 Develop a plan for testing programs.
	59.02 Develop data for use in program testing.
	59.03 Perform debugging activities.
	59.04 Distinguish among the different types of program and design errors.
	59.05 Evaluate program test results.
	59.06 Execute programs and subroutines as they relate to the total application.
	59.07 Develop examples that illustrate the core behavior of each program.
	59.08 Develop examples that illustrate the core behavior of each program component.
	59.09 Illustrate the behavior of boundary cases.
	59.10 Demonstrate an understanding that engineering artifacts requires rigorous and systematic testing.
	59.11 Use examples to show that the solution meets pre-determined criteria.
	59.12 Demonstrate understanding that testing can expose problems but not prove the correctness of the design in an absolute sense.
	59.13 Compile (interpret) and run programs.
60.0	Perform program maintenance. – The student will be able to:
	60.01 Analyze output to identify and annotate errors or enhancements.
61.0	Create and maintain documentation. – The student will be able to:
	61.01 Follow established documentation standards.
62.0	Develop an awareness of software quality assurance. – The student will be able to:
	62.01 Identify the legal and social consequences of errors in software.
	62.02 Describe copyright and other laws that relate to software theft and misuse.

	62.03 Describe software security measures to protect computer systems and data from unauthorized use and tampering (e.g., physical security, passwords, virus protection/prevention).
63.0	Develop an understanding of programming techniques and concepts. – The student will be able to:
	63.01 Identify the basic constructs used in structured programming.
64.0	Design structured programs. – The student will be able to:
	64.01 Design programs that model mathematical relationships from application areas (e.g., accounting, economics, multimedia, programming, science, web).
	64.02 Design programs that deal with multi-faceted objects (e.g., personnel records, physical objects, attributes of HTML tags).
	64.03 Design programs that deal with mixed classes of objects (e.g., a class of geometric shapes containing circles, rectangles, triangles, squares, polygons).
	64.04 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**	
65.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
65.01	Identify and convert graphic formats.
65.02	Demonstrate proficiency in adding Java scripts to web pages.
66.0	Demonstrate proficiency in web page design applicable to the WWW. – The student will be able to:
66.01	Determine the objectives and the audience for Web pages.
66.02	Identify design strategies to reach and keep an audience.
66.03	Use storyboarding to plan a website.
66.04	Create styles and other design elements (e.g. backgrounds, colors, fonts, buttons).
67.0	Demonstrate proficiency in using a WYSIWG editor, web design, or web animation software for web page design. – The student will be able to:
67.01	Apply style sheets for consistent website design.
67.02	Create and edit images and photographs for Web pages using digital imaging software (e.g., ImageReady in Photoshop).
67.03	Insert audio files into a Web page.
67.04	Create, edit and integrate video files into a Web page.
67.05	Create, edit and integrate animation files into a Web page.
67.06	Demonstrate an understanding of photograph compression factors such as transmission speed, color reduction, and browser support.
67.07	Demonstrate knowledge of image formats related to photos and graphics on the Internet (e.g. Graphic formats (TIFF & EPS), Web formats (JPEG, GIF, PNG).
67.08	Save and export a photograph to the Web in the format best for image quality and file size.
67.09	Build, optimize, edit, and test web pages for publication.
67.10	Create a web page that utilizes plug-ins.
67.11	Demonstrate an understanding of network and web implementation issues (e.g., bandwidth, compression, streaming).
67.12	Compare and contrast various methods by which information may be accessed on the Internet/Intranet (e.g., FTP, telnet, browser).
67.13	Demonstrate an understanding of file encryption methods (e.g., secure server, unsecured server).

68.0	Demonstrate proficiency in using digital photography and digital imaging. – The student will be able to:
68.01	Demonstrate knowledge of ethics related to digital imaging, legal and consent issues.
68.02	Apply effective design principles in digital photography compositions.
68.03	Illustrate the essence of an event, quote, or slogan through digital photography/imaging.
68.04	Demonstrate skill in using digital imaging software for image manipulation, color correction and special effects to creatively convey a message or literary interpretation.
68.05	Demonstrate skill in scanning and cropping photographs.
69.0	Design and create webpages suitable for publishing to the Internet. – The student will be able to:
69.01	Explain the need for web-based applications.
69.02	Evaluate a website for basic usability and accessibility issues.
69.03	Display an understanding of the purposes of site maps and wireframes.
69.04	Develop an effective site map for a website.
69.05	Develop effective wireframes for a website.
69.06	Identify industry best practices in visual design.
69.07	Explain the key concepts of meeting client needs.
69.08	Develop an effective look and feel for a website.
69.09	Develop an effective web page template.
69.10	Describe a correct directory structure, naming convention protocol and file organization for a website.
69.11	Characterize effective writing for the web.
69.12	Create effective written content for the web.
69.13	Decide how to best prepare various types of graphical content for use on a web page.
69.14	Develop a User Testing Plan.
69.15	List the steps that are necessary to determine when a website is ready to launch.
69.16	Demonstrate the ability to organize and execute a user testing of a website.
70.0	Describe how website performance is monitored and analyzed. – The student will be able to:

	70.01 Identify issues related to website maintenance.
	70.02 Use webpage validation tools.
	70.03 Describe website performance metrics (e.g., visits, time-on-page, time-on-site) and discuss their design implications.
	70.04 Demonstrate knowledge of accessibility problems and solutions.
	70.05 Examine indexing, page ranking, basic Search Engine Optimization techniques.
	70.06 Explore common website analytic tools.
	70.07 Construct web pages with streaming media content.
71.0	Demonstrate proficiency in hosting a website. – The student will be able to:
	71.01 Apply professional guidelines to choose, search for and register a domain name.
	71.02 Evaluate criteria upon which to select an appropriate web host.
	71.03 Make generalizations about optimal download speed for a particular website.
	71.04 Demonstrate the ability to upload and download files using FTP protocol.
	71.05 Develop a Maintenance Plan for a client.
72.0	Demonstrate the ability to attract traffic for a website. – The student will be able to:
	72.01 Explain and describe the best practices for attracting traffic to websites.
	72.02 Evaluate an effective search engine optimization strategy.
	72.03 Describe tactics for building online credibility.
	72.04 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**	
73.0	Demonstrate knowledge of presentation production issues. – The student will be able to:
73.01	Identify characteristics of various types of presentations (e.g., informing, selling, teaching, entertaining).
73.02	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).
73.03	Identify design characteristics (e.g., fonts, size and styles, backgrounds) that are suited for each type of presentation format and material.
73.04	Demonstrate knowledge of copyright laws including copyright statute, disclaimers, and filing procedures.
73.05	Research and identify skills needed for career positions in multimedia.
73.06	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).
73.07	Demonstrate knowledge of presentation vocabulary/terms.
74.0	Demonstrate proficiency in using digital photography and digital imaging. – The student will be able to:
74.01	Demonstrate knowledge of ethics related to digital imaging, legal and consent issues.
74.02	Apply effective design principles in digital photography compositions.
74.03	Illustrate the essence of an event, quote, or slogan through digital photography/imaging.
74.04	Demonstrate skill in using digital imaging software for image manipulation, color correction, and special effects to creatively convey a message or literary interpretation.
74.05	Demonstrate skill in scanning and cropping photographs.
74.06	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.
75.0	Demonstrate basic video production. – The student will be able to:
75.01	Use current industry standard production video equipment.
75.02	Operate camera in studio and location (field) production environments.
75.03	Demonstrate understanding of digital video storage concepts and digital storage media.
75.04	Demonstrate knowledge of and the ability to operate digital recording decks, and other digital storage devices.
75.05	Identify and select microphones for production needs.

	75.06 Determine appropriate lighting needs for production settings.
	75.07 Identify location and studio lighting types, method of use and application.
76.0	Demonstrate set-up and configuration of a computer for video applications. – The student will be able to:
	76.01 Install basic peripheral devices related to video programs.
	76.02 Install and configure software related to video programs.
	76.03 Demonstrate basic knowledge of computer system requirements.
	76.04 Demonstrate basic knowledge of installing plug-ins or additional audio source material such as beats and or samples.
	76.05 Understand the signal flow of a digital video workstation.
77.0	Demonstrate the basic operation of a video workstation. – The student will be able to:
	77.01 Demonstrate knowledge of the digital video workstation interface.
	77.02 Demonstrate a working familiarity and understanding of the function and operation of digital video workstations.
	77.03 Describe a full digital media production cycle
	77.04 Demonstrate ability to edit, cut, erase, and insert video utilizing various digital production techniques.
	77.05 Record video directly to the digital video workstation.
	77.06 Demonstrate knowledge of editing video according to message.
	77.07 Demonstrate skill in using video effects and plug-ins.
	77.08 Describe a first complete run-through of the video production process
	77.09 Characterize the qualities of effective communication in a completed video
	77.10 Prepare a video project for final compositing and export.
	77.11 Transfer video files between various video software applications.
	77.12 Export finished video.
	77.13 Identify and describe solutions to the challenges and obstacles that arise in a video production
78.0	Demonstrate basic audio production. – The student will be able to:
	78.01 Describe digital audio storage concepts and digital storage media.

	78.02 Operate digital recording decks and other digital storage devices.
	78.03 Describe the function and operation of digital audio workstations.
	78.04 Edit, cut, erase and insert sound utilizing various digital production techniques.
	78.05 Perform digital noise reduction and noise extraction via spectral display.
79.0	Set-up and configure a computer for audio applications. – The student will be able to:
	79.01 Install basic peripheral devices related to audio programs.
	79.02 Install and configure software related to audio programs.
	79.03 Demonstrate basic knowledge of computer system requirements.
	79.04 Install plug-ins or additional audio source material such as beats and or samples.
	79.05 Diagram the signal flow of a digital audio workstation.
80.0	Operate an audio workstation. – The student will be able to:
	80.01 Demonstrate knowledge of the digital audio workstation interface.
	80.02 Create and arrange a multi-track project.
	80.03 Create interest and effect using editing techniques
	80.04 Design and edit audio using a waveform editor.
	80.05 Record audio directly to the digital audio workstation.
	80.06 Mix audio.
	80.07 Demonstrate skill in using audio effects and plug-ins.
	80.08 Prepare an audio project for finishing and final mix down.
	80.09 Transfer audio files between various audio software applications.
	80.10 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.
	80.11 Export finished audio.
81.0	Demonstrate proficiency in using presentation software and equipment. – The student will be able to:
	81.01 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.

81.02	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).
81.03	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**	
82.0	Demonstrate understanding of network technologies–The student will be able to:
82.01	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.
82.02	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.
82.03	Identify the following address formats IPv6, IPv4, and MAC Addressing.
82.04	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.
82.05	Identify common IPv4 and IPv6 routing protocols - Link state OSPF, IS-IS, Distance vector, RIP, RIPv2, BGP and Hybrid EIGRP.
82.06	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).
82.07	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.
83.0	Understand, install, and configure network hardware. – The student will be able to:
83.01	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.
83.02	Identify common connector types such as RJ-11, RJ-45, BNC, SC, ST, LC and RS-232.
83.03	Identify common physical network topologies such as Star, Mesh, Bus, Ring, Point to Point, Point to Multipoint, and Hybrid.
83.04	Differentiate and implement appropriate wiring standards such as 568A, 568 B Straight vs cross over, rollover, and Loopback.
83.05	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.
83.06	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.
83.07	Explain common logical network topologies and their characteristics such as peer to peer, client/server, VPN and VLAN.
83.08	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.
84.0	Understand, install and configure networking devices. – The student will be able to:

	84.01	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.
	84.02	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.
	84.03	Explain the advance features of a switch such as PoE, Spanning tree, VLAN, Trunking, Port mirroring, and Port Authentication.
	84.04	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.
85.0	Understand, install and configure network management software. – The student will be able to:	
	85.01	Explain the function of the OSI layer model such as physical, data link, network, transport, session, presentation and application.
	85.02	Identifies types of configuration management documentation such as wiring schematics, physical and logical network diagram, baselines, policies, procedure and configuration and regulations.
	85.03	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.
	85.04	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.
	85.05	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.
	85.06	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.
	85.07	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.
	85.08	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.
86.0	Understand, install and configure networking tools. – The student will be able to:	
	86.01	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.
	86.02	Explain the purpose of network scanners such as Packet sniffers, Intrusion detection software, Intrusion prevention softwareand Port scanners.
	86.03	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.

87.0	Install, configure, and manage network security hardware and software devices. – The student will be able to:	
	87.01	Explain the function of hardware and software security devices such as Network based firewall, Host based firewall, IDS, IPS, and VPN concentrator.
	87.02	Explain common features of a firewall for example: Application layer vs. network layer, Stateful vs. stateless, Scanning services, Content filtering, Signature identification, and Zones.
	87.03	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.
	87.04	Explain methods of user authentication using the following methods: PKI, Kerberos, AAA, RADIUS, TACACS+, Network access control, 802.1x, CHAP, MS-CHAP, and EAP.
	87.05	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.
	87.06	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**	
88.0	Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends. – The student will be able to:
88.01	Describe the history of cybersecurity, including the evolution of a hacker culture.
88.02	Discuss the trends and national initiatives related to cybersecurity.
88.03	Distinguish between information assurance and cybersecurity.
88.04	Describe the concepts of confidentiality as it relates to user and data impact.
88.05	Explain authentication and the concept of non-repudiation.
88.06	Describe the concept of “Hacking - The Human Element” and elaborate on its implications to cybersecurity.
89.0	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:
89.01	Viruses.
89.02	Trojan Horses.
89.03	Logic Bombs.
89.04	Worms.
90.0	Recognize and be able to differentiate and explain the following access control models. – The student will be able to:
90.01	MAC (Mandatory Access Control).
90.02	DAC (Discretionary Access Control).
90.03	RBAC (Role Based Access Control).
91.0	Recognize and be able to differentiate and explain the following methods of authentication. – The student will be able to:
91.01	Kerberos.
91.02	CHAP (Challenge Handshake Authentication Protocol).
91.03	Certificates.
91.04	Username/Password.
91.05	Tokens.

	91.06 Multi-factor.
	91.07 Mutual.
	91.08 Biometrics.
92.0	Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk. – The student will be able to:
	92.01 DOS/DDOS (Denial of Service/Distributed Denial of Service).
	92.02 Back Door.
	92.03 Spoofing.
	92.04 Man in the Middle.
	92.05 Replay.
	92.06 TCP/IP Hijacking.
	92.07 Weak Keys.
	92.08 Mathematical.
	92.09 Social Engineering.
	92.10 Birthday.
	92.11 Password Guessing (e.g., Brute Force, Dictionary).
	92.12 Software Exploitation.
93.0	Recognize and understand the processes and risks associated with the following security concerns and tasks. – The student will be able to:
	93.01 Identify non-essential services and protocols and know what actions to take to reduce the risks of those services and protocols.
	93.02 Understand the concept of and know how reduce the risks of social engineering.
	93.03 Understand the concept and significance of auditing, logging and system scanning.
	93.04 Identify and be able to differentiate different cryptographic standards and protocols.
94.0	Recognize and understand the administration of the following types of remote access technologies. – The student will be able to:
	94.01 802.1x.
	94.02 VPN (Virtual Private Network).

	94.03 RADIUS (Remote Authentication Dial-In User Service).
	94.04 TACACS (Terminal Access Controller Access Control System).
	94.05 L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).
	94.06 SSH (Secure Shell).
	94.07 IPSEC (Internet Protocol Security).
	94.08 Vulnerabilities.
95.0	Recognize and understand the administration of the following email security concepts. – The student will be able to:
	95.01 S/MIME (Secure Multipurpose Internet Mail Extensions).
	95.02 PGP (Pretty Good Privacy) like technologies.
	95.03 Vulnerabilities.
	95.04 SPAM.
	95.05 Hoaxes.
96.0	Recognize and understand the administration of the following Internet security concepts. – The student will be able to:
	96.01 SSL/TLS (Secure Sockets Layer Transport Layer Security).
	96.02 HTTP/S (Hypertext Transfer Protocol/Hypertext Transfer Protocol over Secure Sockets Layer).
	96.03 Instant Messaging (i.e., Vulnerabilities, Packet Sniffing, Privacy).
97.0	Recognize and understand the administration of the following vulnerabilities. – The student will be able to:
	97.01 Java Script.
	97.02 ActiveX.
	97.03 Buffer Overflows.
	97.04 Cookies.
	97.05 Signed Applets.
	97.06 CGI (Common Gateway Interface).
	97.07 SMTP (Simple Mail Transfer Protocol) Relay.

98.0	Recognize and understand the administration of the following directory security concepts. – The student will be able to:
	98.01 SSL/TLS (Secure Sockets Layer/Transport Layer Security).
	98.02 LDAP (Lightweight Directory Access Protocol).
99.0	Recognize and understand the administration of the following file transfer protocols and concepts. – The student will be able to:
	99.01 S/FTP (File Transfer Protocol).
	99.02 Blind FTP (File Transfer Protocol)/Anonymous.
	99.03 File Sharing.
	99.04 Vulnerabilities (i.e., packet sniffing, naming conventions).
100.0	Recognize and understand the administration of the following wireless technologies and concepts. – The student will be able to:
	100.01 WTLS (Wireless Transport Layer Security).
	100.02 802.11 and 802.11x.
	100.03 WEP/WAP (Wired Equivalent Privacy/Wireless Application Protocol).
	100.04 Vulnerabilities (i.e., site surveys).
101.0	Compare and contrast the following types of intrusion detection in terms of implementation and configuration. – The student will be able to:
	101.01 Network Based – Active and Passive.
	101.02 Host Based – Active and Passive.
	101.03 Honey Pots.
	101.04 Incident Response.
102.0	Be able to identify and explain the following different kinds of cryptographic algorithms. – The student will be able to:
	102.01 Hashing.
	102.02 Symmetric.
	102.03 Asymmetric.
103.0	Understand how cryptography and digital signatures address the following security concepts. – The student will be able to:
	103.01 Confidentiality.

	103.02 Integrity.
	103.03 Authentication.
	103.04 Non-Repudiation.
	103.05 Access Control.
104.0	Understand and be able to explain the following concepts of PKI (Public Key Infrastructure). – The student will be able to:
	104.01 Certificates (e.g., policies, practice statements).
105.0	Understand and be able to explain the following concepts of Key Management and Certificate Lifecycles. – The student will be able to:
	105.01 Centralized versus Decentralized.
	105.02 Hardware versus software key storage.
	105.03 Private key storage.
	105.04 Escrow.
	105.05 Expiration.
	105.06 Revocation versus suspension (e.g., status checking).
	105.07 Recovery authorization schema (e.g., M-of-N Control - Of M appropriate individuals, N must be present to authorize recovery).
	105.08 Renewal.
	105.09 Destruction.
	105.10 Key Usage.
	105.11 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 in the program when implemented at either the secondary or postsecondary level. 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.

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

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 Demonstrate comprehension and communication skills.
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital video.
24.0 Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital audio.
25.0 Apply industry standard workflow management methods applicable to the integration and synchronization of audio and video into a single digital media product.
26.0 Apply industry standard asset management methods applicable to development of a digital media product.
27.0 Explain the importance of calibration in the production of digital media and the means by which it is accomplished.
28.0 Demonstrate proficiency in producing a digital media product for delivery using Digital Video Disc (DVD) media.
29.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based on-demand system (e.g., VOD, IPTV).
30.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based streaming system.
31.0 Demonstrate proficiency in producing a digital media product for delivery using an Internet-based system featuring multi-point presence.
32.0 Demonstrate proficiency in producing a digital media product for delivery using mobile communication devices.
33.0 Demonstrate proficiency in producing a digital media product for delivery using satellite delivery systems.

34.0 Describe the evolution, role, and characteristics of a Content Distribution Network (CDN) for delivering digital media to Internet points.
35.0 Demonstrate an understanding of the uses, technologies, standards, and protocols associated with digital signage.
36.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

	12.09 Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
	13.01 Identify elements of a Web page.
	13.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
	13.03 Define basic HTML terminology.
	13.04 Analyze HTML source code developed by others.
	13.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
	13.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
	13.07 Edit and test HTML documents for accuracy and validity.
	13.08 Use basic functions of WYSIWYG editors.
	13.09 Use basic functions of HTML, DHTML, and XML editors and converters.
	13.10 Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
	14.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
	14.02 Describe and apply color theory as it applies to Web page design (e.g., background, text color).
	14.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	14.04 Use image design software to create and edit images.
	14.05 Demonstrate proficiency in publishing to the Internet.
	14.06 Demonstrate proficiency in adding downloadable forms to web pages.
	14.07 Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
	15.01 Compare and contrast various methods of evaluation for emerging technologies.
	15.02 Demonstrate knowledge of the process of planning upgrades and changeovers.
	15.03 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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, Unix/Linux).

Course Number: DIG0080 **Occupational Completion Point: B** **Digital Media Technician – 600 Hours – SOC Code 15-1142**	
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.
	18.02 Identify and differentiate the appropriate use of digital media formats based on standard industry practices.
	18.03 Identify and differentiate the appropriate use of encoding schemes based on project needs.
	18.04 Identify the difference between digital media source files and digital media delivery systems.
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.
	19.02 Identify the various forms of digital media content distribution.
	19.03 Describe the development of digital media technology as it pertains to digital signage.
	19.04 Describe the impact of mobile and Wi-Fi technologies on the digital media development industry.
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.
	20.02 Compare and contrast the similarities and differences between analog and digital recording.
	20.03 Describe the characteristics of digital video.
	20.04 Identify and describe the various application platforms used in digital video development.
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.
	21.02 Compare and contrast the similarities and differences between analog and digital recording.
	21.03 Describe the characteristics of digital audio.
	21.04 Identify and describe the various application platforms used in digital audio recording and editing.
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.

	22.02 Describe the similarities and differences as well as industry standard platforms used in the development of 2D and 3D graphics.
	22.03 Identify and describe the challenges in developing and deploying digital media content.
	22.04 Identify the components and characteristics of motion that make up an animation.
23.0	Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital video. – The student will be able to:
	23.01 Produce video files according to industry standard specifications using digital media development hardware and software applications.
	23.02 Identify and incorporate the appropriate use of digital video encoding based on industry standard practices.
	23.03 Identify the various tools and procedures utilized in the conversion of digital media file types.
	23.04 Demonstrate proficiency in the utilization of standard video production equipment.
	23.05 Demonstrate proficiency in the connectivity and configuration of digital video equipment.
	23.06 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.
24.0	Demonstrate proficiency configuring and operating equipment and software applications used in the creation and delivery of digital audio. – The student will be able to:
	24.01 Produce audio files according to industry standard specifications using digital media development hardware and software applications.
	24.02 Demonstrate proficiency in the utilization of standard audio production equipment.
	24.03 Demonstrate proficiency in the connectivity and configuration of digital audio equipment.
25.0	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:
	25.01 Describe the various media integration systems and their appropriate uses in the development of digital media.
	25.02 Identify and describe the importance of version control in digital asset management.
	25.03 Identify and describe the various forms of digital audio / video synchronization and the tools and techniques used to sync digital audio and video.
26.0	Apply industry standard asset management methods applicable to development of a digital media product. – The student will be able to:
	26.01 Identify and describe the standard practices for storing and archiving digital media assets.
	26.02 Identify and describe the standard practices for retrieving digital media assets both on local and remote work stations / networks.
	26.03 Describe the standard practices for establishing digital asset security.
	26.04 Describe the purpose and function of metadata as it pertains to the management of digital assets.

27.0	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:
	27.01 Identify the necessity and effects of calibration on various digital media systems.
	27.02 Identify standard practices in calibrating digital media production equipment.
28.0	Demonstrate proficiency in producing a digital media product for delivery using Digital Video Disc (DVD) media – The student will be able to:
	28.01 Identify and describe the various physical and application formats for (DVD) media technology.
	28.02 Identify and describe the various (DVD) physical outputs for media players.
	28.03 Identify the features and specifications of (DVD) media and the (DVD) format.
	28.04 Identify and describe the (DVD) media industry specification (red book standard).
	28.05 Identify and describe the various coding mechanisms utilized in the creation of (DVD) media.
	28.06 Identify and describe standard copy protection practices in (DVD) media creation.
	28.07 Use standard (DVD) authoring / editing systems in the creation of (DVD) media.
	28.08 Identify and describe the appropriate use of standard television formats (PAL & NTSC).
	28.09 Demonstrate an awareness of the issues in quality when compressing digital media.
29.0	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:
	29.01 Develop digital media in the appropriate specified format for delivery on On-Demand Systems.
	29.02 Develop digital media in the appropriate specified format for delivery on Video on demand (VOD) Systems.
	29.03 Develop digital media in the appropriate specified format for delivery on IP Television (IPTV).
30.0	Demonstrate proficiency in producing a digital media product for delivery using an Internet-based streaming system. – The student will be able to:
	30.01 Develop digital media in the appropriate specified format for delivery on On-Demand Systems.
	30.02 Develop digital media in the appropriate specified format for delivery on Video on demand (VOD) Systems.
	30.03 Develop digital media in the appropriate specified format for delivery on IP Television (IPTV).
	30.04 Develop digital media in the appropriate specified format for delivery on Grid Casting systems.
31.0	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:

	31.01	Demonstrate an awareness of the tools and practices used in establishing multiple points of presence.
	31.02	Demonstrate an awareness of design constraints and attributes as they pertain to producing digital media for delivery on internet-based systems.
	31.03	Demonstrate an awareness of communication channels and considerations as they pertain to producing digital media for delivery on internet-based systems.
32.0	Demonstrate proficiency in producing a digital media product for delivery using mobile communication devices. – The student will be able to:	
	32.01	Develop digital media in the appropriate specified format for delivery on smart phones.
	32.02	Develop digital media in the appropriate specified format for delivery on tablet PC.
	32.03	Develop digital media in the appropriate specified format for delivery on laptops.
	32.04	Demonstrate an awareness of Bluetooth considerations as they pertain to the production of digital media for delivery on mobile communication devices.
	32.05	Demonstrate an awareness of security / privacy issues as they pertain to the production of digital media for delivery on mobile communication devices.
	32.06	Demonstrate an awareness of Personalization (e.g., digital identities, authentication) as it pertains to mobile security.
	32.07	Demonstrate an awareness of data portability issues as they pertain to the production of digital media for delivery on mobile communication devices.
	32.08	Demonstrate an awareness of Social Application Programming Interfaces (e.g., OpenSocial).
33.0	Demonstrate proficiency in producing a digital media product for delivery using satellite delivery systems. – The student will be able to:	
	33.01	Identify industry applications utilized in producing a digital media product for delivery using satellite delivery systems.
	33.02	Identify current technologies and capabilities used in the production of a digital media product for delivery using satellite delivery systems.
	33.03	Describe the current limitations (e.g. latency) of delivering digital media via satalite delivery systems.
	33.04	Identify and describe common issues in delivering digital media via simulcast systems.
	33.05	Identify and describe the process of delivering digital media via mulitcast systems.
34.0	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:	
	34.01	Describe content networking techniques as they pertain to the delivering of digital media to internet points.
	34.02	Describe common practices and protocols (e.g., ICAP, OPES) in digital media development.
	34.03	Describe common practices in digital media development as they pertain to the synchronization and loading of digital content across a content distribution network (CDN).

	34.04	Describe common practices in establishing asset security with respect to delivering digital media to content distribution networks (CDN).
35.0	Demonstrate an understanding of the uses, technologies, standards, and protocols associated with digital signage. – The student will be able to:	
	35.01	Demonstrate an understanding of digital signage uses and applications.
	35.02	Demonstrate an understanding of digital signage standards (e.g., SMIL).
	35.03	Demonstrate an understanding of common protocols (e.g., SMS, Bluetooth) used in the distribution of digital media to digital signage.
	35.04	Demonstrate an understanding of display media technology.
	35.04.1	Demonstrate an understanding of the technology associated with conventional displays (LCD, LED, Plasma).
	35.04.2	Demonstrate an understanding of the technology associated with holographic displays.
	35.04.3	Demonstrate an understanding of the technology associated with 3D Displays.
	35.04.4	Demonstrate an understanding of the technology associated with large-scale displays.
	35.05	Demonstrate an understanding of content playback and management as it pertains to the use of digital media via digital signage.
	35.06	Demonstrate an understanding of Network Infrastructure.
	35.07	Demonstrate an understanding of Ethernet network protocols.
	35.07.1	Demonstrate an understanding of Wireless (e.g., Wi-Fi, Bluetooth) network protocols.
	35.07.2	Demonstrate an understanding of digital signage multi-unit synchronization.
36.0	Demonstrate an understanding of Internet Protocol Television (IPTV) systems, their types, applications, and implementation issues. – The student will be able to:	
	36.01	Demonstrate an understanding of converged services and their application to Internet Protocol Television (IPTV).
	36.02	Compare and contrast live versus stored media systems.
	36.03	Demonstrate an understanding of Internet Protocol Television (IPTV) applications and delivery systems.
	36.04	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.

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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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

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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Incorporate Human Computer Interface (HCI) principles of design.
33.0 Research and obtain information for use in designing the user interface.
34.0 Create an intuitive interface using Cascading Style Sheets (CSS).

35.0 Demonstrate proficiency creating a logical website file structure.
36.0 Create a CSS formatted informational website.
37.0 Demonstrate proficiency publishing, testing, monitoring, and maintaining a website.
38.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
39.0 Solve problems using critical thinking skills, creativity and innovation.
40.0 Use information technology tools.
41.0 Describe the roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment.
42.0 Describe the importance of professional ethics and legal responsibilities.
43.0 Discuss the differences between server-side and client-side scripting.
44.0 Compare and contrast client-side scripting languages (JavaScript, VBScript, and ECMAScript).
45.0 Demonstrate understanding of the Document Object Model (DOM).
46.0 Design, write, debug, and incorporate a JavaScript client-side script into a webpage.
47.0 Incorporate basic JavaScript form validation and form handling (using pre-built validation scripts or online libraries).
48.0 Use advanced JavaScript techniques.
49.0 Demonstrate understanding of JavaScript accessibility issues.
50.0 Select and modify appropriate library and pre-built JavaScript to incorporate into webpage.
51.0 Incorporate graphics, animations, and video assets into a webpage design using conventional HTML techniques.
52.0 Demonstrate understanding of XML vocabularies and documents.
53.0 Create and debug an XML Document.
54.0 Create and debug compound documents with Namespaces.
55.0 Demonstrate ability to validate documents with a Data Type Definition (DTD).
56.0 Demonstrate ability to validate documents with XML Schema.
57.0 Demonstrate an understanding of Asynchronous JavaScript and XML (AJAX) and its implications for web developers.
58.0 Plan and implement a multi-page website that features graphics, pictures, and video galleries using AJAX techniques.
59.0 Demonstrate knowledge and skills necessary to setup a secure E-commerce site.
60.0 Identify security issues associated with E-commerce and discuss methods to mitigate risks.
61.0 Apply skills necessary to setup an E-commerce storefront.
62.0 Employ techniques to enhance the value and profitability of an E-commerce website.
63.0 Develop an evaluation and performance monitoring framework featuring established metrics and target goals for an E-commerce website.
64.0 Demonstrate an understanding of Content Management Systems (CMS) and their implications for web development.
65.0 Use CMS features, functions, and extensions/modules to create/enhance a website.
66.0 Evaluate the suitability for and system requirements for a content management system.
67.0 Demonstrate an understanding of multimedia applications and their implications for web designers.
68.0 Create and incorporate interactive website components.
69.0 PDF document usage considerations.
70.0 Create, format, and manipulate PDF documents.
71.0 Display, distribution, and print considerations for PDF documents.
72.0 Create and manage PDF forms.
73.0 Incorporate PDF security in a PDF document.
74.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

	12.09 Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
	13.01 Identify elements of a Web page.
	13.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
	13.03 Define basic HTML terminology.
	13.04 Analyze HTML source code developed by others.
	13.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
	13.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
	13.07 Edit and test HTML documents for accuracy and validity.
	13.08 Use basic functions of WYSIWYG editors.
	13.09 Use basic functions of HTML, DHTML, and XML editors and converters.
	13.10 Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
	14.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
	14.02 Describe and apply color theory as it applies to Web page design (e.g., background and text color).
	14.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	14.04 Use image design software to create and edit images.
	14.05 Demonstrate proficiency in publishing to the Internet.
	14.06 Demonstrate proficiency in adding downloadable forms to web pages.
	14.07 Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
	15.01 Compare and contrast various methods of evaluation for emerging technologies.
	15.02 Demonstrate knowledge of the process of planning upgrades and changeovers.
	15.03 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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).

Course Number: CTS0070 **Occupational Completion Point: B** **Web Design Foundations (Assistant Web Designer) – 150 Hours – SOC Code 15-1199**	
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 of the new web site and the primary goals.
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.
18.07	Create a global site map.
18.08	Discuss the legal and ethical issues related to web design.
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).
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.
20.05	Troubleshoot markup language syntax, elements, and links.

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.
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.
22.02	Discuss the advantages and disadvantages of incorporating tables in a webpage design.
22.03	Define and modify table structures for the presentation of tabular information.
22.04	Create accessible tables using standard table elements and attributes.
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.
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, 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.
25.11	Use CSS to style tables (e.g., borders, width, spacing, alignment, background).
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.
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.
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.
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.
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.
31.03	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**	
32.0	Incorporate Human Computer Interface (HCI) principles of design. – The student will be able to:
32.01	Describe the fundamental design principles of human computer interface.
32.02	Differentiate between computer and human factors in screen/page design.
32.03	Describe what is meant by an “intuitive” interface.
32.04	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.
32.05	Identify and use the following design concepts: contrast, repetition, alignment, proximity, writing style.
32.06	Define and establish logo, identity, and branding needed for an effective website.
32.07	Evaluate the HCI features included on a webpage storyboard.
32.08	Create a series of webpage storyboards that incorporate HCI design principles.
33.0	Research and obtain information for use in designing the user interface. – The student will be able to:
33.01	Identify common user information needs, information gathering models, and methods for gathering user research.
33.02	Define the primary audience and customer expectations and develop a rubric for defining user tasks and corresponding functionality.
33.03	Describe target audience preferences based on demographics (e.g., gender, age, economic status, culture).
33.04	Identify and use web analytic tools to shape an information architecture strategy (determine keywords).
33.05	Apply the results of research and analytics to the design of a user interface.
34.0	Create an intuitive interface using Cascading Style Sheets (CSS). – The student will be able to:
34.01	Create CSS styles suitable for use on an intuitive webpage interface.
34.02	Use element selectors, ID selectors, class selectors, pseudo-class selectors, and descendant selectors to create a table-less webpage design.
34.03	Create a series of templates formatted exclusively using CSS.
34.04	Use CSS syntax to configure and apply style sheets for multiple media displays (e.g., screen display and print).
34.05	Create webpage templates using advanced CSS methods (e.g., create multi-column layouts, mimic client-side technologies, create

	faux columns).
34.06	Differentiate among static, relative, absolute, and fixed positioning schemas.
34.07	Use schemas to design a website: fixed, liquid, elastic designs.
34.08	Recognize browser support for static, relative, absolute, and fixed positioning schemas.
34.09	Identify and correct display issues in a web page using multiple browsers.
35.0	Demonstrate proficiency creating a logical website file structure. – The student will be able to:
35.01	Create an efficient, maintainable directory structure for a website, including the site root and subfolders for assets (e.g., images, templates, CSS).
35.02	Demonstrate and use correct file paths for relative, site root relative, and absolute links.
36.0	Create a CSS formatted informational website. – The student will be able to:
36.01	Use GUI (Graphical User Interface) web authoring software to create a multi-page informational website.
36.02	Create documented CSS style sheets for layout and appearance purposes.
36.03	Incorporate methods used to drive traffic to the website, then engage and retain visitors.
36.04	Apply standard optimization practices (e.g., keyword proximity; density; relevance; appropriate page titles, URLs, and headings, alt tags) to enhance search engine performance.
36.05	Use standard design techniques to correctly display a website using multiple browsers (e.g., box model, hasLayout, Internet Explorer Conditional Comments (IECC)).
36.06	Integrate common multimedia and plug-ins as appropriate to enhance a website design.
36.07	Use client-side technologies such as rollovers, check plug-ins, and pop-up windows to enhance the user interface.
37.0	Demonstrate proficiency publishing, testing, monitoring, and maintaining a website. – The student will be able to:
37.01	Recognize the relationship between local and remote site structure.
37.02	Identify methods of acquiring a domain name, appropriate hosting, and search engine registry.
37.03	Understand and implement strategies to measure website traffic and improve search engine analytics reports.
37.04	Describe the use of standard web marketing technologies (e.g., blogging, podcasting).
37.05	Describe how social media and social networking sites can be used for marketing purposes.
37.06	Test websites using common resolutions, browsers, accessibility, and validation techniques.

	37.07 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.
	37.08 Explore standard practices for feedback and usability testing.
	37.09 Identify and incorporate standard security measures in a website.
	37.10 Identify and use online validation tools.
	37.11 Successfully change invalid markup to comply with standards.
	37.12 Build a webpage that successfully passes the W3C validation test at http://validator.w3.org.
	37.13 Write markup that facilitates accessibility.
	37.14 Use FTP to transfer files to a server.
	37.15 Set up an FTP connection to a remote site and reproduce the site structure on the server.
38.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	38.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	38.02 Locate, organize and reference written information from various sources.
	38.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	38.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	38.05 Apply active listening skills to obtain and clarify information.
	38.06 Develop and interpret tables and charts to support written and oral communications.
	38.07 Exhibit public relations skills that aid in achieving customer satisfaction.
39.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	39.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	39.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	39.03 Identify and document workplace performance goals and monitor progress toward those goals.
	39.04 Conduct technical research to gather information necessary for decision-making.
40.0	Use information technology tools. – The student will be able to:
	40.01 Use personal information management (PIM) applications to increase workplace efficiency.

	40.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	40.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	40.04 Employ collaborative/groupware applications to facilitate group work.
41.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. – The student will be able to:
	41.01 Describe the nature and types of business organizations.
	41.02 Explain the effect of key organizational systems on performance and quality.
	41.03 List and describe quality control systems and/or practices common to the workplace.
	41.04 Explain the impact of the global economy on business organizations.
42.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	42.01 Evaluate and justify decisions based on ethical reasoning.
	42.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	42.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
	42.04 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**	
43.0	Discuss the differences between server-side and client-side scripting. – The student will be able to:
43.01	Describe the role scripting languages play in the creation of websites.
43.02	Identify and describe the advantages, disadvantages, and primary uses of popular scripting languages (e.g., JavaScript, VBScript, Perl, PHP, JScript).
44.0	Compare and contrast client-side scripting languages (JavaScript, VBScript, and ECMAScript). – The student will be able to:
44.01	Describe the primary usage and limitations of JavaScript in a web environment.
44.02	Describe how JavaScript blends with other web-authoring technologies (i.e., HTML, CSS, Server-side programming, Plug-ins).
44.03	Describe the primary differences between JavaScript and VBScript.
44.04	Describe the source, features, and common uses of ECMAScript.
44.05	Explain why JavaScript use far exceeds VBScript for client-side scripting.
44.06	Research resources available to advance JavaScript knowledge.
44.07	Explore emerging trends and upcoming revisions related to JavaScript.
45.0	Demonstrate understanding of the Document Object Model (DOM). – The student will be able to:
45.01	Describe the purpose of the Document Object Model (layout, objects, properties, and methods).
45.02	Describe how JavaScript uses the DOM to detect and manipulate elements on a webpage.
46.0	Design, write, debug, and incorporate a JavaScript client-side script into a webpage. – The student will be able to:
46.01	Write, analyze and explain JavaScript syntax.
46.02	Describe usage of various data types.
46.03	Describe how the use of decision-making logic (AND, OR) is employed in a JavaScript program.
46.04	Create and use variables, operators, and expressions.
46.05	Use common JavaScript events and event handlers (e.g., click, load, onClick, onLoad) to control program flow, appearance, or functionality.
46.06	Understand and incorporate JavaScript arrays (e.g., array basics, types, usage, methods, sorting).
46.07	Understand and incorporate JavaScript functions (e.g., using the DOM, pass a value, return value, create objects, work with classes and objects).

	46.08 Understand and incorporate JavaScript loops and conditions (e.g., loop basics, types, usage).
	46.09 Recognize, isolate, and correct common JavaScript errors (e.g., syntax, function errors, reserved word usage, unsupported DOM).
	46.10 Identify limitations related to obsolete JavaScript constructs and coding practices (e.g., Document.all, navigator.appName).
	46.11 Apply JavaScript best coding practices (i.e., properly documenting scripts, field naming conventions, writing understandable code).
	46.12 Use different methods to incorporate JavaScript onto a web page (e.g., <script> element, JavaScript statement block, external scripts).
	46.13 Troubleshoot and test incorporated script (i.e., functionality, browser usage, resolve known bugs).
47.0	Incorporate basic JavaScript form validation and form handling (using pre-built validation scripts or online libraries). – The student will be able to:
	47.01 Identify and use form elements to solicit user input.
	47.02 Use JavaScript with HTML form controls.
	47.03 Validate web forms prior to submission.
	47.04 Use output commands to display processed data in an appropriately formatted form.
48.0	Use advanced JavaScript techniques. – The student will be able to:
	48.01 Write JavaScript suitable for plug-in detection, image manipulation, and the creation of custom JavaScript objects.
	48.02 Use JavaScript to incorporate, create, update, and delete cookies.
	48.03 Describe the common security issues relevant to JavaScript.
49.0	Demonstrate understanding of JavaScript accessibility issues. – The student will be able to:
	49.01 Describe the purpose of the Browser Object Model (BOM) and how it relates to JavaScript.
	49.02 Describe how obsolete constructs and coding practices affect browser function.
	49.03 Make webpages accessible and functional when JavaScript disabled or unsupported.
	49.04 Demonstrate ability to use XHTML, HTML, and CSS instead of JavaScript where appropriate.
	49.05 Demonstrate ability to determine which version of JavaScript specific browsers support and code program to meet acceptable standards.
50.0	Select and modify appropriate library and pre-built JavaScript to incorporate into webpage. – The student will be able to:
	50.01 Explore common JavaScript libraries and describe the advantages & disadvantages of using libraries.

50.02	Analyze pre-built library items to determine functionality.
50.03	Explain how a library item achieves desired processing.
50.04	Determine if pre-built script provides functionality required in an effective manner.
50.05	Incorporate pre-built library items into web pages.
50.06	Identify the restrictions related to using pre-built scripts (i.e.; copyright, processing, length of script).
50.07	Modify pre-built scripts to suit functionality requirements.
50.08	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**	
51.0	Incorporate graphics, animations, and video assets into a webpage design using conventional HTML techniques. – The student will be able to:
51.01	Use the HREF tag to integrate a video file displayed in a new window.
51.02	Use the EMBED tag to display a graphic animation or a video file as part of the webpage fabric.
51.03	Discuss the limitations of conventional media integration techniques.
52.0	Demonstrate understanding of XML vocabularies and documents. – The student will be able to:
52.01	Understand XML vocabularies.
52.02	Define well-formed and valid XML documents.
52.03	Describe the basic structure of an XML document.
53.0	Create and debug an XML document. – The student will be able to:
53.01	Create an XML declaration.
53.02	Work with XML comments.
53.03	Create XML elements and attributes.
53.04	Work with character and entity references.
53.05	Describe how XML handles character data, parsed character data, and white space.
53.06	Work with XML parsers.
53.07	Understand how Web browsers work with XML documents.
53.08	Apply a style sheet to an XML document.
53.09	Create an XML processing instruction.
54.0	Create and debug compound documents with Namespaces. – The student will be able to:
54.01	Understand compound documents and the problem of name collision.
54.02	Declare a namespace for an XML vocabulary.
54.03	Apply a namespace to an element.

	54.04 Create a default namespace.
	54.05 Apply a namespace to an attribute.
	54.06 Declare a namespace within a CSS style sheet.
	54.07 Apply a namespace to a style selector.
	54.08 Use the escape character to apply a namespace to a selector.
	54.09 Create a compound document containing XML and XHTML elements and attributes.
55.0	Demonstrate ability to validate documents with a Data Type Definition (DTD). – The student will be able to:
	55.01 Understand the principles of data validation.
	55.02 Create a DOCTYPE.
	55.03 Specify the content of an XML element.
	55.04 Define the structure of child elements.
	55.05 Describe how DOCTYPE changed from HTML4.01 to HTML5.
56.0	Demonstrate ability to validate documents with XML Schema. – The student will be able to:
	56.01 Compare schemas and DTDs.
	56.02 Explore different schema vocabularies.
	56.03 Declare simple type elements and attributes.
	56.04 Declare complex type elements.
	56.05 Apply a schema to an instance document.
	56.06 Work with XML Schema data types.
	56.07 Derive new data types for text strings, numeric values, and dates.
	56.08 Create data types for patterned data using regular expressions.
	56.09 Explore different schema structures.
	56.10 Attach a schema to a namespace.
	56.11 Validate compound instance documents.

	56.12 Import one schema file into another.
57.0	Demonstrate an understanding of Asynchronous JavaScript and XML (AJAX) and its implications for web developers. – The student will be able to:
	57.01 Identify the technologies that comprise AJAX and explain how they interact.
	57.02 Describe the purpose, advantages, disadvantages, and functions of AJAX.
	57.03 Describe how AJAX works and how it is used in the creation of websites.
	57.04 Identify AJAX requirements.
	57.05 Install and setup the AJAX Control Toolkit.
	57.06 Define appropriate use of AJAX in a web project.
	57.07 Identify AJAX Usability and Accessibility issues and their workarounds.
	57.08 Describe AJAX related browser compatibility issues and their workarounds.
	57.09 Explore popular AJAX applications currently on the Internet (auto-complete (Google), updating user content (Twitter), voting and rating (social bookmarking))
	57.10 Describe common security issues associated to AJAX.
	57.11 Analyze the server-side implications of AJAX applications.
	57.12 Explore methods for testing and maintaining an AJAX application.
	57.13 Explore the future of AJAX and its implementation.
58.0	Plan and implement a multi-page website that features graphics, pictures, and video galleries using AJAX techniques. – The student will be able to:
	58.01 Research AJAX design principles and patterns (e.g., Observer, Command, MVC).
	58.02 Research and compare popular AJAX frameworks, libraries, and toolkits (e.g., JQuery, DOJO, Prototype).
	58.03 Identify and implement methods of using AJAX when JavaScript not available (e.g. progressive enhancement).
	58.04 Update specific areas of a page with data from the server (e.g., server-login updated) without reloading the webpage.
	58.05 Demonstrate the ability to output results in different formats (e.g., XML, JSON, alternatives to JavaScript).
	58.06 Use AJAX to create form submission & validation (e.g. password strength check, email/URL validation).
	58.07 Integrate a basic slideshow via lightbox using AJAX techniques.

58.08 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**	
59.0	Demonstrate knowledge and skills necessary to setup a secure E-commerce site. – The student will be able to:
59.01	Compare and contrast popular pre-built shopping cart software (e.g., PrestaShop, Zend Cart).
59.02	Compare and contrast hosting options available for use with shopping cart software (i.e., shared hosting or dedicated server).
59.03	Discuss shopping cart vulnerabilities and best-practice preventative measures.
59.04	Identify hardware and software necessary to install and setup pre-built shopping cart software.
59.05	Install and configure necessary software (database, server) to run pre-built shopping cart software.
59.06	Install and configure pre-built shopping cart software.
59.07	Verify database and server connectivity.
59.08	Test and troubleshoot setup/configuration issues.
60.0	Identify security issues associated with E-commerce and discuss methods to mitigate risks. – The student will be able to:
60.01	Describe the differences between Transaction Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL).
60.02	Explain transaction security.
60.03	Identify security and payment processing issues involved in developing a site (e.g., SSL, Digital Certificates, SET Protocol, Cyber Cash).
60.04	Demonstrate understanding of https and htaccess and their usage.
60.05	Explore methods to obtain an SSL certificate and secure transactions.
60.06	Compare and contrast the appropriateness of employing a merchant account or a payment gateway to handle online transactions.
60.07	Discuss the process, advantages, disadvantages, and costs associated with opening a merchant account.
60.08	Describe the process, advantages, disadvantages, and costs associated with using a payment gateway.
61.0	Apply skills necessary to setup an E-commerce storefront. – The student will be able to:
61.01	Setup and use an FTP (File Transfer Protocol) program to transfer files to a web server.
61.02	Add business specific information to site storefront (e.g., logos, product images, descriptions).
61.03	Setup back-end site administration functions and navigation.

61.04	Setup a schema for incorporating shipping, handling, and processing fees based on carrier, geographical zones, and weight/price range.
61.05	Experiment with various add-ons, themes, and modules available for customization.
61.06	Customize shopping cart to suit client needs (e.g., modify fields, add buttons).
61.07	Customize forms to accommodate client products and/or services.
61.08	Setup Search preferences and functionality for products and/or services.
61.09	Setup customer contact preferences and email notification functionality.
61.10	Apply Search Engine Optimization (SEO) techniques to shopping cart pages.
61.11	Test operation of shopping cart pages in multiple browsers.
61.12	Troubleshoot issues and errors related to browser display and functionality.
62.0	Employ techniques to enhance the value and profitability of an E-commerce website. – The student will be able to:
62.01	Determine business goals for the E-commerce site.
62.02	Identify the various types of advertising options in E-commerce (e.g., links, banner ads, affiliate programs, pop-up windows, viral marketing, newsgroup postings).
62.03	Describe affiliate marketing and its implications for E-commerce websites.
62.04	Analyze popular affiliate programs/networks and available payment schemes.
62.05	Explain the differences, advantages, and disadvantages of CPM, PPC, and Pay per Sale/Lead.
62.06	Determine appropriate affiliate program for target audience.
62.07	Identify the method to join an affiliate program/network.
62.08	Identify considerations/requirements of selecting an affiliate program.
62.09	Determine appropriate number of affiliate programs necessary to suit client site.
62.10	Determine the terms and conditions of sale, including warranties, after-sales service, and privacy assurances.
62.11	Determine customer service options (e.g., e-mail, phone, fax).
62.12	Create a site map.
62.13	Create a Frequently Asked Questions (FAQ) page.
62.14	Create a product/version comparison chart, where appropriate.

	62.15 Create feedback, review, survey, and recommendation pages.
63.0	Develop evaluation and performance monitoring frameworks featuring established metrics and target goals for an E-commerce website. – The student will be able to:
	63.01 Research existing and emerging analytical, usability, SEO tools to improve customer satisfaction and site conversion rates.
	63.02 Describe web analytics tools and their features/functions.
	63.03 Use web analytics tools to determine optimum site keywords.
	63.04 Experiment with using advanced segments to view subsets of data (relating to purchasing habits, website usage, searches).
	63.05 Customize analytic reports using appropriate metrics (e.g., average per-visit value, bounce rates, time spent on page).
	63.06 Create more concise reports using advanced filters in web analytics tools.
	63.07 Use intelligence features of web analytics tools to discover patterns of usage and setup corresponding alerts.
	63.08 Research popular mobile analytics tools (e.g., Motally) and their features.
	63.09 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**	
64.0	Demonstrate an understanding of Content Management Systems (CMS) and their implications for web development. – The student will be able to:
64.01	Describe the fundamental operation of a CMS.
64.02	Describe the typical features of a content management system.
64.03	Compare and contrast popular CMS applications (e.g., WordPress, Joomla).
64.04	Describe how a content management system can be used to enhance website interactivity.
64.05	Demonstrate proficiency installing and configuring content management systems and extensions/modules.
65.0	Use CMS features, functions, and extensions/modules to create/enhance a website. – The student will be able to:
65.01	Create a basic multipage website using a content management system.
65.02	Enhance a webpage by using a content management system to incorporate images, animations, or video segments.
65.03	Incorporate a blog feature into a website using a content management system.
65.04	Demonstrate proficiency using CMS built-in security for website, password and database backup.
65.05	Demonstrate proficiency using add-on modules, or plug-ins.
66.0	Evaluate the suitability for and system requirements for a content management system. – The student will be able to:
66.01	Identify business goals and evaluate their suitability for a content management system.
66.02	Determine web hosting system requirements.
66.03	Create a schema for creating, deleting, and managing users and their permissions.
66.04	Discuss the value represented by templates in a content management system development environment.
67.0	Demonstrate an understanding of multimedia applications and their implications for web designers. – The student will be able to:
67.01	Compare and contrast the leading multimedia development applications for website development (e.g., Adobe Flash, Microsoft Silverlight).
67.02	Describe those circumstances whereby multimedia may be used to add interactivity to a website.
67.03	Describe the limitations of multimedia development applications relative to website development.
68.0	Create and incorporate interactive website components. – The student will be able to:

68.01	Create buttons, menus, and other components that feature a static, hover, and rollover effect.
68.02	Convert original artwork into an interactive component with associated script behavior.
68.03	Adjust the component properties including opacity, filter, rotation, and action.
68.04	Resize a multi-layer component to ensure uniform resizing of each layer.
68.05	Create scrolling images, panels, and lists for incorporating into a web design.
68.06	Create and incorporate animated banners, headers, and website introduction pages (e.g., Adobe Flash, Microsoft Silverlight).
69.0	PDF document usage considerations. – The student will be able to:
69.01	Discuss the advantages and disadvantages of using PDF documents in a web site.
69.02	Research and discuss PDF document usage best practices.
69.03	Determine when it is appropriate to use PDF documents (e.g., brochure downloads, large reports, catalogs, interactive forms).
69.04	Compare and contrast the functionality of software applications used to create and process PDFs.
69.05	Research and describe search engine optimization considerations related to the use of PDF documents.
69.06	Research and discuss security issues related to PDF document usage in a web site (viruses, auto-open).
69.07	Identify accessibility issues related to using PDF documents in a web site.
70.0	Create, format, and manipulate PDF documents. – The student will be able to:
70.01	List and describe the methods available for creating PDF documents.
70.02	Create a PDF using a variety of software applications, multiple files, and web pages.
70.03	Demonstrate ability to format, modify and enhance a PDF document.
70.04	Describe the differences in PDF standards for document prepress data interchange and long-term archiving.
70.05	Embed images, text, audio, video, and Flash content into a PDF document.
70.06	Create and modify automatically generated and manual bookmarks in a PDF document.
70.07	Add clickable links to a PDF document.
70.08	Incorporate Find and Search methods to locate specific text in a PDF document.
70.09	Describe the method used to search scanned documents (optical character recognition).

	70.10 Understand and correct color separation issues.
	70.11 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).
	70.12 Export a PDF document in a different format.
71.0	Display, distribution, and print considerations for PDF documents. – The student will be able to:
	71.01 Define file specifications use to generate smaller files for electronic distribution and on-screen display.
	71.02 Specify image downsampling and compression settings to generate a PDF file with a smaller file size.
	71.03 Identify and correct potential printing issues in a PDF document.
	71.04 Ensure a PDF document meets appropriate criteria for print or electronic distribution.
	71.05 Demonstrate ability to control flattening of a transparent PDF document and misregistration.
	71.06 Demonstrate color management techniques that affect on-screen display and printing.
	71.07 Discuss methods and tools used to review a PDF document (email, shared, tracking).
72.0	Create and manage PDF forms. – The student will be able to:
	72.01 Create an interactive from using fields, form objects, and distribution methods.
	72.02 Distribute a form electronically and manage distributed forms.
	72.03 Demonstrate ability to redact content in a form to protect sensitive information.
	72.04 Preview, test, and modify an interactive form.
73.0	Incorporate PDF security in a PDF document. – The student will be able to:
	73.01 Secure a PDF document using passwords, encryption, digital IDs and signatures.
	73.02 Creating Security Policies and Certificates for a PDF document.
	73.03 Enable usage rights for Adobe Readers.
74.0	Demonstrate proficiency using HTML5 features and functions. – The student will be able to:
	74.01 Apply HTML5 APIs in web pages for interactivity (e.g., audio/video, drag & drop, drawing canvas).
	74.02 Apply HTML5 interactivity elements into web pages (i.e., <canvas>, <embed>, <audio>, <video>, <details> <input>).
	74.03 Utilize HTML5 fallback strategies to address browser support issues.

74.04	Utilize HTML5 to define dynamic behaviors using JavaScript.
74.05	Use HTML5 specification to manipulate text & images.
74.06	Use HTML5 to create persistent data and single session storage (HTML 5 Local Offline Storage & Session Storage).
74.07	Use HTML5 for media event handling (audio, video, embed, image).
74.08	Use HTML5 event handling for window, mouse, and form events.
74.09	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 comprising the Software Development Core. Secondary or postsecondary students who have previously completed the Software Development Core will not have to repeat the core. 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.

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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Design a computer program to meet specific physical, operational, and interaction criteria.
27.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
28.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
29.0 Create a unit test plan, implement the plan, and report the results of testing.
30.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
31.0 Solve problems using critical thinking skills, creativity and innovation.
32.0 Use information technology tools.
33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.

34.0 Describe the importance of professional ethics and legal responsibilities.
35.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
36.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
37.0 Design, document, and create object-oriented computer programs.
38.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
39.0 Construct statements that declare, initialize, and modify different types of variables used in Java programs.
40.0 Describe the types and characteristics of lexical units in the Java programming language.
41.0 Describe the data types employed in Java programs.
42.0 Construct Java statements that employ the use of various operators.
43.0 Write executable statements using Java.
44.0 Describe variable scope and its implications in Java programming.
45.0 Apply common Java programming style guidelines and conventions.
46.0 Demonstrate use of the compiler and interpreter through command line interface.
47.0 Construct conditional control statements in Java.
48.0 Construct iterative control statements in Java.
49.0 Use nested loop iterative control statements in Java.
50.0 Produce input and output for Java programs.
51.0 Use packages and import statements in a Java program.
52.0 Create a Java program that uses methods.
53.0 Create a Java program that uses parameters in methods.
54.0 Describe and use recursion in a Java program.
55.0 Construct Java statements that use the String class to manipulate String data.
56.0 Construct Java statements that use Classes.
57.0 Manage class relationships.
58.0 Construct Java statements that illustrate the use of multiplicities in class relationships.
59.0 Use object references.
60.0 Describe the types of arrays and construct Java statements that illustrate the use and manipulation of multi-dimensional and jagged arrays.
61.0 Construct Java statements that illustrate different ways of using inheritance.
62.0 Construct Java statements that use collections.
63.0 Write Java code that uses the Iterator and List interfaces.
64.0 Create Java code that includes exception handling code.
65.0 Create Java code that uses the Object class.
66.0 Use standard library classes that comprise the Java API.
67.0 Create Java code that uses exceptions to improve program quality.
68.0 Describe Java 2 Micro Edition (J2ME) uses, characteristics, and constraints.
69.0 Create and convert classes using Unified Modeling Language (UML).
70.0 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).
71.0 Demonstrate an understanding of Java Integration APIs, including Java Message Service (JMS), Enterprise JavaBeans (EJB), and Java Naming and Directory Interface (JNDI).
72.0 Demonstrate an understanding of Java Client APIs, including the Abstract Window Toolkit (AWT), Swing, and Java applet.
73.0 Understand and apply Java 2 Enterprise Edition (J2EE) Server Solutions.

74.0 Create a database application using the Java programming language.
75.0 Create a graphical user interface application using the Java programming language.
76.0 Create a web-based application using the Java programming language.
77.0 Write code to perform common and union database queries using SQL and Java.
78.0 Implement Java program statements using objects.
79.0 Utilize debugging tools and write error handlers.
80.0 Demonstrate file I/O.
81.0 Utilize API functions.
82.0 Test and debug databases.
83.0 Successfully work as a member of a software development team.
84.0 Manage time according to a plan.
85.0 Keep acceptable records of progress, problems and solutions.
86.0 Plan, organize and carry out a project plan.
87.0 Manage resources.
88.0 Use tools, materials, and processes in an appropriate and safe manner.
89.0 Demonstrate an understanding of the software development process.
90.0 Research content related to the project and document the results.
91.0 Use presentation skills, and appropriate media to describe the progress, results and outcome of the experience.
92.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project..
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

	12.09 Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
	13.01 Identify elements of a Web page.
	13.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
	13.03 Define basic HTML terminology.
	13.04 Analyze HTML source code developed by others.
	13.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
	13.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
	13.07 Edit and test HTML documents for accuracy and validity.
	13.08 Use basic functions of WYSIWYG editors.
	13.09 Use basic functions of HTML, DHTML, and XML editors and converters.
	13.10 Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
	14.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
	14.02 Describe and apply color theory as it applies to Web page design (e.g., background and text color).
	14.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	14.04 Use image design software to create and edit images.
	14.05 Demonstrate proficiency in publishing to the Internet.
	14.06 Demonstrate proficiency in adding downloadable forms to web pages.
	14.07 Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
	15.01 Compare and contrast various methods of evaluation for emerging technologies.
	15.02 Demonstrate knowledge of the process of planning upgrades and changeovers.
	15.03 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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
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.
18.02	Identify tasks performed by programmers.
18.03	Describe how businesses use computer programming to solve business problems.
18.04	Investigate job opportunities in the programming field.
18.05	Explain different specializations and the related training in the computer programming field.
18.06	Explain the need for continuing education and training of computer programmers.
18.07	Explain enterprise software systems and how they impact business.
18.08	Describe ethical responsibilities of computer programmers.
18.09	Describe the role of customer support to software program quality.
18.10	Identify credentials and certifications that may improve employability for a computer programmer.
18.11	Identify devices, tools, and other environments for which programmers may develop software.
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.
19.02	Explain the types and uses of variables in programs.
19.03	Determine the best data type to use for given programming problems.
19.04	Identify the types of operations that can be performed on different data types.
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.
19.06	Explain how computers store different data types in memory.
19.07	Use different number systems to represent data.
19.08	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.
19.09	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.
20.02	Explain iterative programming structures (e.g., while, do/while) and their uses.
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.
21.02	Identify the characteristics, uses, and limits of high-level programming languages.
21.03	Identify the characteristics, uses, and limits of rapid development programming languages.
21.04	Describe object-oriented concepts.
21.05	Explain the characteristics of procedural and object-oriented programming languages.
21.06	Compare and contrast programming languages that are compiled (e.g., C++), interpreted (e.g., Basic, HTML), and translated (e.g., Java).
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.
22.02	Describe the stages of the program life cycle.
22.03	Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).
22.04	List and explain the steps in the program development cycle.
22.05	Describe different types of documentation used in the program development cycle (e.g., requirements document, program design documents, test plans).
22.06	Describe the on-going need for program maintenance.
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).
22.08	Describe different methods used to facilitate version control and change management.
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.
23.02	Explain testing performed at different stages of the program development cycle (e.g. unit testing, system testing, user acceptance testing).
23.03	Describe data and the use of test plans/scripts to be used in program testing.

	23.04	Describe and identify types of programming errors (e.g., syntactical, logic, usability, requirements mismatch).
	23.05	Identify the data to be used for boundary conditions.
	23.06	Explain different types of testing (e.g., usability, automated, regression) and testing tools.
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).
	24.02	Describe tools for developing a program design (e.g., UML, flowcharts, design documents, pseudocode).
	24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.
	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).
	24.05	Write a program design document using UML or other standard design methodology.
	24.06	Define input and output for a program module using UML or other standard design methodology.
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.
	25.02	Identify different types of threats to computer systems.
	25.03	Identify methods to protect against different threats to computer systems.
	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).
26.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:	
	26.01	Choose appropriate data types depending on the needs of the program.
	26.02	Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).
	26.03	Design and develop program that are designed for efficiency (e.g., less memory usage, less inputs/outputs, faster processing).
	26.04	Identify the software environment required for a program to run (e.g., operating system required, mobile, Web-based, desktop, delivery method).
	26.05	Identify the tools required to develop a program (e.g., editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).
27.0	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:	

	27.01	Use appropriate naming conventions to define program variables and modules (methods, functions).
	27.02	Use a program editor to write the source code for a program.
	27.03	Write programs that use selection structures (e.g., if, if/else).
	27.04	Write programs that use repetition structures (e.g., while, do/while).
	27.05	Write programs that use nested structures.
	27.06	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.
	27.07	Compile and run programs.
	27.08	Write programs that use standard arithmetic operators with different numerical data types.
	27.09	Write programs that use standard logic operators.
	27.10	Write programs that use a variety of common data types.
	27.11	Write programs that perform data conversion between standard data types.
	27.12	Write programs that define, use, search, and sort arrays.
	27.13	Write programs that use user-defined data types.
	27.14	Demonstrate understanding and use of appropriate variable scope.
28.0		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:
	28.01	Write programs that perform user input and output.
	28.02	Write programs that validate user input (e.g., range checking, data formats, valid/invalid characters).
	28.03	Write program modules such as functions, subroutines, or methods.
	28.04	Write program modules that accept arguments.
	28.05	Write program modules that return values.
	28.06	Write program modules that validate arguments and return error codes.
	28.07	Write interactive programs.
	28.08	Write programs that use standard libraries to enhance program function.
	28.09	Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common

	programming standards.
29.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
29.01	Write a unit test plan that identifies the input data and expected results for program tests.
29.02	Test and debug programs, including programs written by others.
29.03	Write a test report that identifies the results of testing.
29.04	Trace through the function of a program to ensure valid operation.
29.05	Identify the system resources used by the program (e.g., memory, disk space, execution time, external devices).
29.06	Create a disaster / emergency response plan for a computer system.
30.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
30.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
30.02	Locate, organize and reference written information from various sources.
30.03	Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
30.04	Interpret verbal and nonverbal cues/behaviors that enhance communication.
30.05	Apply active listening skills to obtain and clarify information.
30.06	Develop and interpret tables and charts to support written and oral communications.
30.07	Exhibit public relations skills that aid in achieving customer satisfaction.
31.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
31.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.
31.02	Employ critical thinking and interpersonal skills to resolve conflicts.
31.03	Identify and document workplace performance goals and monitor progress toward those goals.
31.04	Conduct technical research to gather information necessary for decision-making.
32.0	Use information technology tools. – The student will be able to:
32.01	Use personal information management (PIM) applications to increase workplace efficiency.
32.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.

	32.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	32.04 Employ collaborative/groupware applications to facilitate group work.
33.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	33.01 Employ leadership skills to accomplish organizational goals and objectives.
	33.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	33.03 Conduct and participate in meetings to accomplish work tasks.
34.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	34.01 Evaluate and justify decisions based on ethical reasoning.
	34.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	34.03 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**	
35.0	Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:
35.01	Demonstrate the understanding and use of classes, objects, attributes, and behaviors.
35.02	Demonstrate the understanding and use of inheritance.
35.03	Demonstrate the understanding and use of data encapsulation.
35.04	Demonstrate the understanding and use of polymorphism.
36.0	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:
36.01	Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.
36.02	Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.
36.03	Design an object-oriented program using UML or another standard design methodology.
36.04	Work with other team members to develop a project plan for a program.
36.05	Work with other team members to write a design document for a program with multiple functions and shared data.
36.06	Participate in design meetings that review program design documents for conformance to program requirements.
36.07	Estimate the time to develop a program or module.
37.0	Design, document, and create object-oriented computer programs. – The student will be able to:
37.01	Compare and contrast recursive functions to other iterative methods.
37.02	Understand the implementation of character strings in the programming language.
37.03	Write programs that perform string processing (e.g., string manipulation, string compares, concatenation).
37.04	Write programs that use user-defined data types.
37.05	Write object-oriented programs that use inheritance.
37.06	Write object-oriented programs that use polymorphism.
37.07	Develop class constructors.
37.08	Write programs that define and use program constants.

	37.09	Write programs that perform error handling.
	37.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.
	37.11	Write programs that perform dynamic memory allocation.
	37.12	Write programs that perform effective management of dynamically allocated memory.
	37.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal and external) related to version control.
	37.14	Write programs that use complex data structures (e.g., stacks, queues, trees, linked lists).
	37.15	Write programs that are event-driven.
	37.16	Write programs that perform file input and output (i.e., sequential, random access file input/output).
	37.17	Perform basic database commands including connect, open, select, and close.
38.0	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:	
	38.01	Develop a test plan for an object-oriented program.
	38.02	Write test plans for event-driven programs.
	38.03	Write test plans for programs that perform file input and output.
	38.04	Perform test and debug activities on object-oriented programs, including those written by someone else.
	38.05	Perform test and debug activities on an event-driven program.
	38.06	Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.
	38.07	Document the findings of testing in a test report.

Course Number: CTS0031 **Occupational Completion Point: D** **Java Developer – 600 Hours – SOC Code 15-1131**	
39.0	Construct statements that declare, initialize, and modify different types of variables used in Java programs. – The student will be able to:
39.01	Describe how variables are used in programs.
39.02	Identify the eight Java primitive data types.
39.03	Identify the minimum and maximum ranges of primitive data types.
39.04	Identify which data type should be used for a given situation.
39.05	Identify the syntax for using variables.
39.06	Declare and initialize variables.
39.07	Assign new values to variables.
39.08	Create and use constant variables.
40.0	Describe the types and characteristics of lexical units in the Java programming language. – The student will be able to:
40.01	Describe the types of lexical units.
40.02	Describe identifiers and identify valid and invalid identifiers.
40.03	Describe and identify reserved words, delimiters, literals, and comments.
41.0	Describe the data types employed in Java programs. – The student will be able to:
41.01	Describe the data type categories.
41.02	Give examples of primitives, reference data types.
41.03	Identify and use enumerations.
41.04	Understand the use of Wrapper Classes in programs.
41.05	Describe the difference between real and integer data types.
42.0	Construct Java statements that employ the use of various operators. – The student will be able to:
42.01	Construct statements using arithmetic operators.
42.02	Construct statements using relational operators.

	42.03 Construct and use statements using logical operators.
	42.04 Construct and use statements using assignment operators.
	42.05 Construct and execute statements using operator precedence.
43.0	Write executable statements using Java. – The student will be able to:
	43.01 Construct variable assignment statements.
	43.02 Construct statements using built-in Math functions.
	43.03 Differentiate between implicit and explicit data type conversions.
	43.04 Describe when implicit data type conversions take place.
	43.05 List the drawbacks of implicit data type conversions.
	43.06 Describe the process of autoboxing and promotion.
	43.07 Construct statements using functions to explicitly convert data types.
44.0	Describe variable scope and its implications in Java programming. – The student will be able to:
	44.01 Understand the scope and visibility of variables.
	44.02 Write programs using local variables.
	44.03 Describe the scope of a variable.
	44.04 Describe the default value of local, instance, and static scope of variables.
	44.05 Describe how compiler uses scope to identify variables with the same name.
45.0	Apply common Java programming style guidelines and conventions. – The student will be able to:
	45.01 List examples of good programming practices.
	45.02 Insert comments into code.
	45.03 Follow formatting guidelines when writing code.
	45.04 Understand the different types of errors produced by programs.
46.0	Demonstrate use of the compiler and interpreter through command line interface. – The student will be able to:
	46.01 Describe the use of the Java compiler (javac) and Java interpreter (Java VM).

	46.02 Demonstrate the use of the - classpath flag and –d flag to the compiler.
	46.03 Identify the environmental variables of PATH and CLASSPATH.
	46.04 Describe the process of command line arguments to the program.
	46.05 Create programs that take in multiple command line arguments.
47.0	Construct conditional control statements in Java. – The student will be able to:
	47.01 Construct and use an if statement.
	47.02 Construct and use a switch statement.
	47.03 Construct and use a while, do while, and for loop.
	47.04 Construct and use a conditional operator.
48.0	Construct iterative control statements in Java. – The student will be able to:
	48.01 Describe the types of loop statements and their uses.
	48.02 Construct and use the while and do while loop.
	48.03 Construct and use the for loop.
	48.04 Construct and use the enhanced for loop.
	48.05 Describe when a while loop is used.
	48.06 Describe when a for loop is used.
49.0	Use nested loop iterative control statements in Java. – The student will be able to:
	49.01 Construct and execute a program using nested loops.
	49.02 Construct and execute a loop using break and continue.
	49.03 Evaluate a nested loop construct and sentinel value.
50.0	Produce input and output for Java programs. – The student will be able to:
	50.01 Describe and use classes (e.g., Scanner, System) to input data into programs.
	50.02 Demonstrate the use of different ways to input data into programs using Scanner or System class.
	50.03 Describe and demonstrate the use of the System class to produce output to the console.

	50.04 Explain the difference between print and println functions in the System class.
	50.05 Create and use escape sequences.
51.0	Use packages and import statements in a Java program. – The student will be able to:
	51.01 Describe the use of import statements.
	51.02 Describe the use of packages.
	51.03 Create code that uses package statements to avoid class conflict.
	51.04 Create packages that abide by standard Java naming convention.
	51.05 Demonstrate the use of Java-API to search for classes and packages.
52.0	Create a Java program that uses methods. – The student will be able to:
	52.01 Differentiate between anonymous blocks and methods.
	52.02 Identify the benefits of using methods.
	52.03 Describe a method signature.
	52.04 Create a method.
	52.05 Describe how a method is invoked.
	52.06 Describe the purpose of overloading methods.
	52.07 Create overloaded methods in programs.
53.0	Create a Java program that uses parameters in methods. – The student will be able to:
	53.01 Describe how parameters are passed into functions.
	53.02 Define a parameter.
	53.03 Create a method using a parameter.
	53.04 Invoke a method that has parameters.
	53.05 Distinguish between formal and actual parameters.
	53.06 Demonstrate the use of reference parameters in methods.
54.0	Describe and use recursion in a Java program. – The student will be able to:

	54.01 Describe the use of recursion in solving problems.
	54.02 Describe the difference of iterative and recursive methods.
	54.03 Demonstrate the use of direct recursion.
	54.04 Demonstrate the use of indirect recursion.
55.0	Construct Java statements that use the String class to manipulate String data. – The student will be able to:
	55.01 Explain the use of the String class.
	55.02 Create code to concatenate strings using the concatenation operator.
	55.03 Demonstrate how to search a string using indexOf method of the String class.
	55.04 Explain the effect of immutability of Strings.
	55.05 Create Strings using string literals, and through new keyword.
	55.06 Demonstrate the use of the following string manipulation methods of the String class: charAt,length, trim, substring, replace, startsWidth and endsWith.
56.0	Construct Java statements that use Classes. – The student will be able to:
	56.01 Describe and identify abstract data types.
	56.02 Describe the difference between an object and a class.
	56.03 Identify class attributes.
	56.04 Create instance variables for a class.
	56.05 Use visibility modifiers for attributes.
	56.06 Identify constructors and describe their use.
	56.07 Describe encapsulation.
	56.08 Write class using encapsulation.
	56.09 Apply data abstraction through the use of accessor or and mutator methods.
	56.10 Describe the equals method.
	56.11 Demonstrate the use of classes in methods as both parameters and return types.
	56.12 Describe the garbage collection process.

	56.13 Demonstrate reusability and extensibility in class creation.
	56.14 Demonstrate the use of Comparable interface to compare objects.
57.0	Manage class relationships. – The student will be able to:
	57.01 Explain the association relationship among classes.
	57.02 Explain the direct association relationship among classes.
	57.03 Explain the composition and aggregation relationship among classes.
	57.04 Explain the direct association relationship among classes.
	57.05 Write programs that use composition, association.
	57.06 Write programs that use direct association.
58.0	Construct Java statements that illustrate the use of multiplicities in class relationships. – The student will be able to:
	58.01 Describe how multiplicities affect class relationships.
	58.02 Describe one-to one, one-to-many, and many-to-many relationships.
	58.03 Write programs that use multiplicities in class relationships.
59.0	Use object references. – The student will be able to:
	59.01 Identify reference aliases.
	59.02 Understand and use null reference.
	59.03 Explain the this reference and its use in class creation.
60.0	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:
	60.01 Declare and initialize and array.
	60.02 Demonstrate the use of initializer lists.
	60.03 Demonstrate the use of arrays in methods.
	60.04 Demonstrate the updating, populating and destroying arrays.
	60.05 Explain linear and binary searching.
	60.06 Sort arrays using selection sort, insertion sort, and bubble sort.

	60.07 Demonstrate the use of multidimensional arrays.
	60.08 Demonstrate the use of jagged arrays.
	60.09 Demonstrate basic hashing using arrays.
61.0	Construct Java statements that illustrate different ways of using inheritance. – The student will be able to:
	61.01 Explain the purpose and use of inheritance in object oriented programming.
	61.02 Explain the difference between single and multiple inheritance.
	61.03 Create parent and child classes.
	61.04 Create overloaded methods.
	61.05 Describe the has-a and is-a relationship.
	61.06 Create class hierarchies.
	61.07 Explain the process of generalization to specification.
	61.08 Demonstrate the use of abstract classes.
	61.09 Explain polymorphism.
	61.10 Create a program that uses polymorphism.
	61.11 Demonstrate the use of the instanceof method.
62.0	Construct Java statements that use collections. – The student will be able to:
	62.01 Describe data structure of linked lists.
	62.02 Create a linked list manually.
	62.03 Use the ArrayList class.
	62.04 Create a stack and Queue manually.
	62.05 Use the Stack and Queue standard class.
	62.06 Identify which data structure is best fitted for a situation.
	62.07 Use iterators with collections.
	62.08 Identify how to insert, delete, update, and traverse data structures.

63.0	Write Java code that uses the Iterator and List interfaces. – The student will be able to:
	63.01 Describe the purpose of interfaces.
	63.02 Create and use interfaces in programs.
	63.03 Use the Comparable interface.
	63.04 Use the Iterator interface and List Interface in programs.
	63.05 Understand the program to the interface principle.
64.0	Create Java code that includes exception handling code. – The student will be able to:
	64.01 Describe the advantages of including exception handling code.
	64.02 Describe the purpose of an EXCEPTION section in a program block.
	64.03 Create code to include an EXCEPTION section.
	64.04 List the guidelines for exception handling.
65.0	Create Java code that uses the Object class. – The student will be able to:
	65.01 Understand the Object class relationship to other classes.
	65.02 Demonstrate the use of toString method.
	65.03 Demonstrate the use of clone and finalize methods.
	65.04 Write program to use Object class functionality.
66.0	Use standard library classes that comprise the Java API. – The student will be able to:
	66.01 Describe the classes and methods in the basic input/output package.
	66.02 Describe the classes and methods in the utilities package.
	66.03 Describe the classes and methods in the utilities package.
	66.04 Describe the classes and methods in the networking package.
	66.05 Describe the classes and methods in the AWT and swing package.
	66.06 Describe the classes and methods in the SQL and SQLX package.
67.0	Create Java code that uses exceptions to improve program quality. – The student will be able to:

	67.01 Explain how exception handling works in Java.
	67.02 Trap exceptions using try and catch.
	67.03 Explain when to use the finally clause.
	67.04 Demonstrate handling exceptions through throwing and catching.
	67.05 Create and Exception and manage the exception.
	67.06 Explain the use of inheritance and exceptions.
68.0	Describe Java 2 Micro Edition (J2ME) uses, characteristics, and constraints. – The student will be able to:
	68.01 Understand midlets.
	68.02 Explain CLDC and profiles.
	68.03 Explain the constraints specific to J2ME programming when compared to J2SE.
	68.04 Understand the high architectural goal of J2ME.
	68.05 Create user-defined functions.
69.0	Create and convert classes using Unified Modeling Language (UML). – The student will be able to:
	69.01 Identify UML elements Classes, abstract Classes, Interfaces.
	69.02 Identify UML attributes, operators, visibility modifiers and UML associations.
	69.03 Given a set of classes be able to convert the classes to a UML diagram.
	69.04 Given a UML diagram be able to create classes.
70.0	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:
	70.01 Understand and describe RMI.
	70.02 Write a program to use RMI.
	70.03 Understand RDMS and SQL technologies.
	70.04 Use the Java Database Connectivity API to connect and execute SQL statements to RDMS.
71.0	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:
	71.01 Understand and describe JMS.

	71.02 Understand and describe EJB technology.
	71.03 Understand and describe JNDI technology.
72.0	Demonstrate an understanding of Java Client APIs, including the Abstract Window Toolkit (AWT), Swing, and Java applet. – The student will be able to:
	72.01 Understand and describe AWT and GUI interface.
	72.02 Understand and describe the use of Swing components and GUI.
	72.03 Understand and describe the use of applet technology.
73.0	Understand and apply Java 2 Enterprise Edition (J2EE) Server Solutions. – The student will be able to:
	73.01 Understand java Web Services.
	73.02 Underrated and use SMTP and Java Mail technologies.
	73.03 Understand how to use JSP and Servlets.
74.0	Create a database application using the Java programming language. – The student will be able to:
	74.01 Utilize loop statements.
	74.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
	74.03 Create user-defined functions.
	74.04 Utilize common built-in functions.
	74.05 Declare variables in modules and procedures.
	74.06 Declare arrays, and initialize elements of arrays.
	74.07 Declare and use object variables and collections, and use their associated properties and methods.
	74.08 Declare symbolic constants, and make them available locally or publicly.
	74.09 Respond to events.
75.0	Create a graphical user interface application using the Java programming language. – The student will be able to:
	75.01 Utilize loop statements.
	75.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
	75.03 Create user-defined functions.

	75.04 Utilize common built-in functions.
	75.05 Declare variables in modules and procedures.
	75.06 Declare arrays, and initialize elements of arrays.
	75.07 Declare and use object variables and collections, and use their associated properties and methods.
	75.08 Declare symbolic constants, and make them available locally or publicly.
	75.09 Use the Java Event model to handle user inputs from events.
	75.10 Use JComponents and layout managers to create the GUI.
76.0	Create a web-based application using the Java programming language. – The student will be able to:
	76.01 Utilize loop statements.
	76.02 Given a scenario, use arithmetic, comparison, and pattern-matching operators.
	76.03 Create user-defined functions.
	76.04 Utilize common built-in functions.
	76.05 Declare variables in modules and procedures.
	76.06 Declare arrays, and initialize elements of arrays.
	76.07 Declare and use object variables and collections, and use their associated properties and methods.
	76.08 Declare symbolic constants, and make them available locally or publicly.
	76.09 Write JSP pages to process user input.
	76.10 Write Servlets to provide input and output processing for the web solution.
77.0	Write code to perform common and union database queries using SQL and Java. – The student will be able to:
	77.01 Utilize SQL to write common queries.
	77.02 Refer to objects by using SQL.
	77.03 Utilize union queries.
78.0	Implement Java program statements using objects. – The student will be able to:
	78.01 Determine when to use data access objects.

	78.02 Differentiate between objects and collections.
	78.03 Write statements that access and modify database objects, EJB objects.
	78.04 Select appropriate methods and property settings for use with specified objects.
79.0	Utilize debugging tools and write error handlers. – The student will be able to:
	79.01 Trap errors.
	79.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.
	79.03 Debug code samples.
	79.04 Utilize the Debugger to monitor variable values.
	79.05 Write an error handler.
80.0	Demonstrate file input/output (I/O). – The student will be able to:
	80.01 Read from sequential and random access files.
	80.02 Write to sequential and random access files.
	80.03 Use file serialization.
81.0	Utilize API functions. – The student will be able to:
	81.01 Properly declare functions.
	81.02 Use the by value and by reference parameters.
82.0	Test and debug databases. – The student will be able to:
	82.01 Implement error handling.
	82.02 Test and debug library databases.
83.0	Successfully work as a member of a software development team. – The student will be able to:
	83.01 Accept responsibility for specific tasks in a given situation.
	83.02 Document progress, and provide feedback on work accomplished in a timely manner.
	83.03 Complete assigned tasks in a timely and professional manner.
	83.04 Reassign responsibilities when the need arises.

	83.05 Complete daily tasks as assigned on one's own initiative.
84.0	Manage time according to a plan. – The student will be able to:
	84.01 Set realistic time frames and schedules.
	84.02 Keep a written time sheet of work accomplished on a daily basis.
	84.03 Meet goals and objectives set by the team.
	84.04 Identify individual priorities.
	84.05 Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities as needed.
85.0	Keep acceptable records of progress problems and solutions. – The student will be able to:
	85.01 Develop a record keeping system in the form of a log book to record daily progress.
	85.02 Use a project journal to identify problem statement.
	85.03 Develop a portfolio of work accomplished to include design drawings, flowcharts, drawings and plans, and prototypes.
86.0	Plan, organize, and carry out a project plan. – The student will be able to:
	86.01 Determine the scope of a project.
	86.02 Organize the team according to individual strengths.
	86.03 Assign specific tasks within a team.
	86.04 Determine project priorities.
	86.05 Identify required resources.
	86.06 Plan research, design, development, and evaluation activities as required.
	86.07 Carry out the project plan to successful completion.
87.0	Manage resources. – The student will be able to:
	87.01 Identify required resources for each stage of the project plan.
	87.02 Determine the methods needed to acquire needed resources.
	87.03 Demonstrate good judgment in the use of resources.
	87.04 Recycle and reuse resources where appropriate.

	87.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.
88.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:
	88.01 Identify the proper tool for a given job.
	88.02 Use tools and machines in a safe manner.
	88.03 Adhere to laboratory or job site safety rules and procedures.
	88.04 Identify the application of processes appropriate to the task at hand.
	88.05 Identify materials appropriate to their application.
89.0	Demonstrate an understanding of the software development process. – The student will be able to:
	89.01 State the goals of the software application clearly.
	89.02 Identify and write a plan to achieve each goal.
	89.03 Develop a list of materials and content required for each goal.
	89.04 Develop a step by step procedure for developing the application.
	89.05 Follow a written procedure.
	89.06 Record data from evaluation activities.
	89.07 Document conclusions and solutions based on evaluation results, observations and data.
	89.08 Document progress using a project log.
	89.09 Write an abstract describing the project plan.
90.0	Research content related to the project and document the results following industry conventions. – The student will be able to:
	90.01 Identify the basic research needed to develop the project plan.
	90.02 Identify available resources for completing background research required in the project plan.
	90.03 Demonstrate the ability to locate resource materials in a library, data base, internet and other research resources.
	90.04 Demonstrate the ability to organize information retrieval.
	90.05 Demonstrate the ability to prepare a topic outline.
	90.06 Write a draft of the research report.

	90.07	Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.
	90.08	Prepare an electronically composed research paper in proper form.
	90.09	Conduct an alpha and beta evaluation of the project's product.
	90.10	Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.
91.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:	
	91.01	Prepare a multi-media presentation on the completed project.
	91.02	Make an oral presentation, using multi-media materials.
	91.03	Review the presentation, and make changes in the delivery method(s) to improve presentation skills.
92.0	Demonstrate competency in the area of expertise related to developing computer software using the Java programming language. – The student will be able to:	
	92.01	Demonstrate a mastery of the content of the selected subject area.
	92.02	Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.
	92.03	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 comprising the Software Development Core. Secondary or postsecondary students who have previously completed the Software Development Core will not have to repeat the core. 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.

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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Design a computer program to meet specific physical, operational, and interaction criteria.
27.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
28.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
29.0 Create a unit test plan, implement the plan, and report the results of testing.
30.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
31.0 Solve problems using critical thinking skills, creativity and innovation.
32.0 Use information technology tools.
33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.

34.0 Describe the importance of professional ethics and legal responsibilities.
35.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
36.0 Create a project plan for an object-oriented programming project that defines requirements, structural design, time estimates, and testing elements.
37.0 Design, document, and create object-oriented computer programs.
38.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results
39.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
40.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
41.0 Develop the process of creating an entity by identifying relationships.
42.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
43.0 Consider the degree and optionality of relationships of entities.
44.0 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.
45.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
46.0 Demonstrate proficiency in designing and adding complexity to an entity-relationship model (ERM).
47.0 Apply complex ERM information by fine-tuning entities and the process for relating them.
48.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
49.0 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.
50.0 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.
51.0 Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database.
52.0 Extend the logical model presentation model by normalizing the data and mapping the management system.
53.0 Apply techniques for building a storage management system by creating a website using templates and wizards.
54.0 Demonstrate design and functionality by constructing a group business presentation.
55.0 Demonstrate comprehension of database modeling competency through group presentation.
56.0 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.
57.0 Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements.
58.0 Demonstrate proficiency working with columns, characters, and rows in SQL.
59.0 Demonstrate proficiency in using SQL comparison operators.
60.0 Demonstrate proficiency in using logical comparisons and precedence rules.
61.0 Demonstrate proficiency using SQL single row functions.
62.0 Demonstrate proficiency displaying data from multiple tables.
63.0 Demonstrate proficiency aggregating data using group functions.
64.0 Demonstrate proficiency utilizing subqueries.
65.0 Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language.
66.0 Demonstrate proficiency creating and managing database objects.
67.0 Demonstrate proficiency altering tables and constraints implementing views.
68.0 Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects.
69.0 Demonstrate ability to control user access and SQL language interface and reporting tool.
70.0 Demonstrate comprehension of bundling features of SQL.

71.0 Demonstrate comprehension working with composite data types by writing executable script files.
72.0 Describe the differences between SQL and SQL extension languages.
73.0 Create program blocks.
74.0 Use variables in program blocks.
75.0 Recognize lexical units.
76.0 Recognize data types.
77.0 Use scalar data types.
78.0 Use various types of joins.
79.0 Use SQL group functions and subqueries.
80.0 Write executable statements.
81.0 Use nested blocks and variable scope.
82.0 Use good programming practices.
83.0 Write DML statements to manipulate data.
84.0 Retrieve data.
85.0 Manipulate data.
86.0 Use transaction control statements
87.0 Use IF conditional control statements.
88.0 Use CASE conditional control statements.
89.0 Use basic LOOP iterative control statements.
90.0 Use WHILE and FOR loop iterative control statements.
91.0 Use nested loop iterative control statements.
92.0 Use explicit cursors.
93.0 Use explicit cursor attributes.
94.0 Use cursor FOR loops.
95.0 Use cursors with parameters.
96.0 Use cursors for update transactions.
97.0 Use multiple cursors.
98.0 Handle exceptions.
99.0 Trap server exceptions.
100.0 Trap user-defined exceptions.
101.0 Create procedures.
102.0 Use parameters in procedures.
103.0 Pass parameters.
104.0 Create stored functions.
105.0 Use functions in SQL statements.
106.0 Manage procedures and functions.
107.0 Manage object privileges.
108.0 Use invoker’s rights.
109.0 Create packages.
110.0 Manage package constructs.
111.0 Use advanced package concepts.
112.0 Manage persistent state of package variables.

113.0 Use vendor-supplied packages.
114.0 Understand dynamic SQL.
115.0 Understand triggers.
116.0 Create DML triggers.
117.0 Create DDL and database event triggers.
118.0 Manage triggers.
119.0 Use large object data types.
120.0 Manage binary types.
121.0 Manage indexes.
122.0 Manage dependencies.
123.0 Program a database application.
124.0 Utilize the basic concepts of database design.
125.0 Utilize SQL and union queries.
126.0 Implement program statements using objects.
127.0 Utilize debugging tools and write error handlers.
128.0 Demonstrate file I/O.
129.0 Create forms and identify all the properties of a form.
130.0 Manipulate data using object models
131.0 Develop custom controls.
132.0 Utilize API functions.
133.0 Demonstrate database replication and implement database replication using programming tools.
134.0 Analyze and implement security options.
135.0 Implement client/server applications.
136.0 Optimize the performance of a database.
137.0 Perform application distribution.
138.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

12.09	Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
13.01	Identify elements of a Web page.
13.02	Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
13.03	Define basic HTML terminology.
13.04	Analyze HTML source code developed by others.
13.05	Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
13.06	Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
13.07	Edit and test HTML documents for accuracy and validity.
13.08	Use basic functions of WYSIWYG editors.
13.09	Use basic functions of HTML, DHTML, and XML editors and converters.
13.10	Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
14.01	Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
14.02	Describe and apply color theory as it applies to Web page design (e.g., background, text color).
14.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
14.04	Use image design software to create and edit images.
14.05	Demonstrate proficiency in publishing to the Internet.
14.06	Demonstrate proficiency in adding downloadable forms to web pages.
14.07	Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
15.01	Compare and contrast various methods of evaluation for emerging technologies.
15.02	Demonstrate knowledge of the process of planning upgrades and changeovers.
15.03	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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
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.
18.02	Identify tasks performed by programmers.
18.03	Describe how businesses use computer programming to solve business problems.
18.04	Investigate job opportunities in the programming field.
18.05	Explain different specializations and the related training in the computer programming field.
18.06	Explain the need for continuing education and training of computer programmers.
18.07	Explain enterprise software systems and how they impact business.
18.08	Describe ethical responsibilities of computer programmers.
18.09	Describe the role of customer support to software program quality.
18.10	Identify credentials and certifications that may improve employability for a computer programmer.
18.11	Identify devices, tools, and other environments for which programmers may develop software.
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.
19.02	Explain the types and uses of variables in programs.
19.03	Determine the best data type to use for given programming problems.
19.04	Identify the types of operations that can be performed on different data types.
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.
19.06	Explain how computers store different data types in memory.
19.07	Demonstrate the difference between "data" and "information."
19.08	Use different number systems to represent data.
19.09	Explain how national and international standards (*i.e.*, ASCII, UNICODE) are used to represent non-numerical data.

	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.
	20.02 Explain iterative programming structures (*e.g.*, while, do/while) and their uses.
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.
	21.02 Identify the characteristics, uses, and limits of high-level programming languages.
	21.03 Identify the characteristics, uses, and limits of rapid development programming languages.
	21.04 Describe object-oriented concepts.
	21.05 Explain the characteristics of procedural and object-oriented programming languages.
	21.06 Compare and contrast programming languages that are compiled (*e.g.*, C++), interpreted (*e.g.*, Basic, HTML), and translated (*e.g.*, Java).
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.
	22.02 Describe the stages of the program life cycle.
	22.03 Compare and contrast alternatives methods of program development (*e.g.*, rapid prototyping, waterfall).
	22.04 List and explain the steps in the program development cycle.
	22.05 Describe different types of documentation used in the program development cycle (*e.g.*, requirements document, program design documents, test plans).
	22.06 Describe the on-going need for program maintenance.
	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).
	22.08 Describe different methods used to facilitate version control and change management.
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.
	23.02 Explain testing performed at different stages of the program development cycle (*e.g.* unit testing, system testing, user acceptance testing).

	23.03	Describe data and the use of test plans/scripts to be used in program testing.
	23.04	Describe and identify types of programming errors (*e.g.*, syntactical, logic, usability, requirements mismatch).
	23.05	Identify the data to be used for boundary conditions.
	23.06	Explain different types of testing (*e.g.*, usability, automated, regression) and testing tools.
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, rapid application development).
	24.02	Describe tools for developing a program design (*e.g.*, UML, flowcharts, design documents, pseudocode).
	24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.
	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).
	24.05	Write a program design document using UML or other standard design methodology.
	24.06	Define input and output for a program module using UML or other standard design methodology.
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.
	25.02	Identify different types of threats to computer systems.
	25.03	Identify methods to protect against different threats to computer systems.
	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).
26.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:	
	26.01	Choose appropriate data types depending on the needs of the program.
	26.02	Define appropriate user interface prompts for clarity and usability (*e.g.*, user guidance for data ranges, data types).
	26.03	Design and develop program that are designed for efficiency (*e.g.*, less memory usage, less inputs/outputs, faster processing).
	26.04	Identify the software environment required for a program to run (*e.g.*, operating system required, mobile, Web-based, desktop, delivery method).
	26.05	Identify the tools required to develop a program (*e.g.*, editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).

27.0	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:
27.01	Use appropriate naming conventions to define program variables and modules (methods, functions).
27.02	Use a program editor to write the source code for a program.
27.03	Write programs that use selection structures (*e.g.*, if, if/else).
27.04	Write programs that use repetition structures (*e.g.*, while, do/while).
27.05	Write programs that use nested structures.
27.06	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.
27.07	Compile and run programs.
27.08	Write programs that use standard arithmetic operators with different numerical data types.
27.09	Write programs that use standard logic operators.
27.10	Write programs that use a variety of common data types.
27.11	Write programs that perform data conversion between standard data types.
27.12	Write programs that define, use, search, and sort arrays.
27.13	Write programs that use user-defined data types.
27.14	Demonstrate understanding and use of appropriate variable scope.
28.0	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:
28.01	Write programs that perform user input and output.
28.02	Write programs that validate user input (*e.g.*, range checking, data formats, valid/invalid characters).
28.03	Write program modules such as functions, subroutines, or methods.
28.04	Write program modules that accept arguments.
28.05	Write program modules that return values.
28.06	Write program modules that validate arguments and return error codes.
28.07	Write interactive programs.

	28.08 Write programs that use standard libraries to enhance program function.
	28.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
29.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	29.01 Write a unit test plan that identifies the input data and expected results for program tests.
	29.02 Test and debug programs, including programs written by others.
	29.03 Write a test report that identifies the results of testing.
	29.04 Trace through the function of a program to ensure valid operation.
	29.05 Identify the system resources used by the program (*e.g.*, memory, disk space, execution time, external devices).
	29.06 Create a disaster/emergency response plan for a computer system.
30.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	30.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	30.02 Locate, organize and reference written information from various sources.
	30.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	30.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	30.05 Apply active listening skills to obtain and clarify information.
	30.06 Develop and interpret tables and charts to support written and oral communications.
	30.07 Exhibit public relations skills that aid in achieving customer satisfaction.
31.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	31.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	31.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	31.03 Identify and document workplace performance goals and monitor progress toward those goals.
	31.04 Conduct technical research to gather information necessary for decision-making.
32.0	Use information technology tools. – The student will be able to:
	32.01 Use personal information management (PIM) applications to increase workplace efficiency.

32.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
32.03	Employ computer operations applications to access, create, manage, integrate, and store information.
32.04	Employ collaborative/groupware applications to facilitate group work.
33.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
33.01	Employ leadership skills to accomplish organizational goals and objectives.
33.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
33.03	Conduct and participate in meetings to accomplish work tasks.
34.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
34.01	Evaluate and justify decisions based on ethical reasoning.
34.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
34.03	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**	
35.0	Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:
35.01	Demonstrate the understanding and use of classes, objects, attributes, and behaviors.
35.02	Demonstrate the understanding and use of inheritance.
35.03	Demonstrate the understanding and use of data encapsulation.
35.04	Demonstrate the understanding and use of polymorphism.
36.0	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:
36.01	Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.
36.02	Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.
36.03	Design an object-oriented program using UML or another standard design methodology.
36.04	Work with other team members to develop a project plan for a program.
36.05	Work with other team members to write a design document for a program with multiple functions and shared data.
36.06	Participate in design meetings that review program design documents for conformance to program requirements.
36.07	Estimate the time to develop a program or module.
37.0	Design, document, and create object-oriented computer programs. – The student will be able to:
37.01	Compare and contrast recursive functions to other iterative methods.
37.02	Understand the implementation of character strings in the programming language.
37.03	Write programs that perform string processing (*e.g.*, string manipulation, string compares, concatenation).
37.04	Write programs that use user-defined data types.
37.05	Write object-oriented programs that use inheritance.
37.06	Write object-oriented programs that use polymorphism.
37.07	Develop class constructors.

	37.08	Write programs that define and use program constants.
	37.09	Write programs that perform error handling.
	37.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.
	37.11	Write programs that perform dynamic memory allocation.
	37.12	Write programs that perform effective management of dynamically allocated memory.
	37.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal, external) related to version control.
	37.14	Write programs that use complex data structures (*e.g.*, stacks, queues, trees, linked lists).
	37.15	Write programs that are event-driven.
	37.16	Write programs that perform file input and output (*i.e.*, sequential and random access file input/output).
	37.17	Perform basic database commands including connect, open, select, and close.
38.0	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:	
	38.01	Develop a test plan for an object-oriented program.
	38.02	Write test plans for event-driven programs.
	38.03	Write test plans for programs that perform file input and output.
	38.04	Perform test and debug activities on object-oriented programs, including those written by someone else.
	38.05	Perform test and debug activities on an event-driven program.
	38.06	Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.
	38.07	Document the findings of testing in a test report.

Course Number: CTS0062 **Occupational Completion Point: D** **Database Programmer – 600 Hours – SOC Code 15-1131**	
39.0	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:
39.01	Cite examples of jobs, salary, and opportunities he/she will have as a database programmer.
39.02	Describe the role a database plays in a business.
39.03	Understand the importance of clear communication when discussing business informational requirements.
39.04	Identify important historical contributions in database development and design.
40.0	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:
40.01	Identify and analyze the phases of the database development process.
40.02	Explain what logical data modeling and database design involve.
40.03	Compare database development process with that of the application development process.
40.04	Distinguish between a logical model and a physical implementation.
41.0	Develop the process of creating an entity by identifying relationships. – The student will be able to:
41.01	Identify and model various types of entities.
41.02	Identify naming and drawing conventions for entities.
41.03	Sequence the steps that are necessary for creation of an entity.
41.04	Analyze and model the relationships between entities.
42.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. – The student will be able to:
42.01	Analyze and model attributes.
42.02	Identify unique identifiers for each entity.
42.03	Develop an entity relationship diagram tagging attributes with optionality.
43.0	Consider the degree and optionality of relationships of entities. – The student will be able to:
43.01	Create entity relationship models based on information requirements and interviews.

	43.02 Differentiate between one-to-many, many-to-many and one-to-one relationships.
	43.03 Identify relationship between two entities by reading a given diagram.
	43.04 Create a relationship between instances of the same entity.
	43.05 Read an entity relationship model in order to validate it.
44.0	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:
	44.01 Identify the significance of an attribute that has more than one value for each entity instance.
	44.02 Evaluate appropriate methods of storing validation rules for attributes.
	44.03 Recognize unique identifiers inherited from other entities.
	44.04 Sequence the steps involved in resolving a many-to-many relationship.
45.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. – The student will be able to:
	45.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).
	45.02 Resolve many-to-many relationships with intersection entities.
	45.03 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.
	45.04 Create exclusive entities and relationships by using subtypes and arcs, respectively.
	45.05 Identify initial layout for presentation and generate a list of action items for members of group.
	45.06 Develop an entity relationship model using subtypes, super-types and an exclusive arc.
46.0	Demonstrate proficiency in designing and adding complexity to an entity-relationship model (ERM). – The student will be able to:
	46.01 Revise an entity relationship model according to client requirements.
	46.02 Define and give examples of hierarchical and recursive relationships.
	46.03 Differentiate between transferable and non-transferable relationships.
	46.04 Deliver a professional, formal business style presentation.
	46.05 Evaluate and critique presentation layout, design and performance.
	46.06 Construct a model using both recursion and hierarchies to express the same logical meaning.
47.0	Apply complex ERM information by fine-tuning entities and the process for relating them. – The student will be able to:

	47.01 Describe a relational database and how it differs from other database systems.
	47.02 Define primary keys and foreign keys and describe their purpose.
	47.03 Describe what data integrity refers to and list some constraints.
	47.04 Explain how database design fits into the database development process.
	47.05 Translate an entity-relationship model into a relational database design.
	47.06 Document a database design using table instance charts.
48.0	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:
	48.01 Demonstrate ability to implement steps for mapping entity relationship models for implementation.
	48.02 Document an initial database design on table instance charts.
	48.03 Recognize raw data and evaluate the steps for creating a data group in unnormalized form (UNF).
49.0	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:
	49.01 Differentiate between unnormalized data and normalized.
	49.02 Move data from an unnormalized form through to a third normal form.
	49.03 Demonstrate ability to test data groups for third normal form compliance.
	49.04 Identify optimized data groups from given groups of normalized data.
50.0	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:
	50.01 Compare the normalization and entity relationship modeling (ERM) techniques in terms of strengths and weaknesses.
	50.02 Further define normalization and explain its benefits.
	50.03 Place tables in third normal form.
	50.04 Explain how logical data modeling rules ensure normalized tables.
	50.05 Specify referential integrity constraints and design indices.
51.0	Apply blueprint principles to begin designing a tool for creating a web-based interface access to a database. – The student will be able to:
	51.01 Evaluate the transformation of business requirements into an initial layout and design for a database.

	51.02 Construct simple web page design for personal work folder.
	51.03 Evaluate existing web sites and determine quality of design.
52.0	Extend the logical model presentation model by normalizing the data and mapping the management system. – The student will be able to:
	52.01 Formulate a plan of action for the Database Project using skills previously learned in this course.
	52.02 Normalize a logical model to the third normal form (3NF).
	52.03 Create a table in the database using a database authoring tool.
	52.04 Demonstrate ability to edit tables using a database authoring tool.
	52.05 Create forms that will display the table components created with a database authoring tool.
53.0	Apply techniques for building a storage management system by creating a website using templates and wizards. – The student will be able to:
	53.01 Create a web site that displays the database project home.
	53.02 Link a web site to create a web-enabled interface to the industry database.
	53.03 Edit the forms created and specify appropriate field labels for data entry.
54.0	Demonstrate design and functionality by constructing a group business presentation. – The student will be able to:
	54.01 Evaluate and generate criteria for a formal, business presentation.
	54.02 Construct a persuasive group presentation using the guidelines set forth in class.
55.0	Demonstrate comprehension of database modeling competency through group presentation. – The student will be able to:
	55.01 Deliver a formal business presentation for the class that discusses an entity-relationship model and initial database design.
	55.02 Demonstrate the functionality of the database and the layout/design capabilities of a database authoring tool.
	55.03 Prepare appropriate end-user documentation.
	55.04 Self-assess learning experience through the presentation and demonstration of their final database project.
56.0	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:
	56.01 Identify the structural elements of a relational database table.
	56.02 List and describe the system development life cycle.
	56.03 Describe the industry implementation of the relational database management system (RDBMS) and object relational database

	management system (ORDBMS).
56.04	Explain how SQL and languages that extend SQL are used in the industry product set.
56.05	Identify the advantages of a database management system.
57.0	Demonstrate comprehension of aspects of SQL language interface by writing basic SQL statements. – The student will be able to:
57.01	List the capabilities of SQL SELECT statements.
57.02	Execute a basic select statement.
57.03	Differentiate between SQL statements and language commands that extend SQL.
58.0	Demonstrate proficiency working with columns, characters, and rows in SQL. – The student will be able to:
58.01	Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression.
58.02	Use column aliases to rename columns in the query result.
58.03	Eliminate duplicate rows in the query result.
58.04	Display the structure of a table.
58.05	Apply SQL syntax to restrict the rows returned from a query.
58.06	Demonstrate application of the WHERE clause syntax.
58.07	Construct and produce output using a SQL query containing character strings and date values.
59.0	Demonstrate proficiency in using SQL comparison operators. – The student will be able to:
59.01	Apply the proper comparison operator to return a desired result.
59.02	Demonstrate proper use of BETWEEN, IN, and LIKE conditions to return a desired result.
59.03	Distinguish between zero and the value of NULL as unavailable, unassigned, unknown, or inapplicable.
59.04	Explain the use of comparison conditions and NULL.
60.0	Demonstrate proficiency in using logical comparisons and precedence rules. – The student will be able to:
60.01	Evaluate logical comparisons to restrict the rows returned based on two or more conditions.
60.02	Apply the rules of precedence to determine the order in which expressions are evaluated and calculated.
60.03	Construct a query to order a results set for single or multiple columns.

	60.04 Construct a query to sort a results set in ascending or descending order.
61.0	Demonstrate proficiency using SQL single row functions. – The student will be able to:
	61.01 Perform calculations on data.
	61.02 Modify individual data items.
	61.03 Use character, number and date functions in SELECT statements.
	61.04 Format data and numbers for display purposes.
	61.05 Convert column data types.
62.0	Demonstrate proficiency displaying data from multiple tables. – The student will be able to:
	62.01 Construct select statements to access data from more than one table using equity and non-equality joins.
	62.02 Use outer joins through viewing data that generally does not meet a join condition.
	62.03 Join a table to itself.
63.0	Demonstrate proficiency aggregating data using group functions. – The student will be able to:
	63.01 Identify the available group functions and describe their use.
	63.02 Demonstrate the ability to group data through the use of the GROUP BY clause.
	63.03 Demonstrate the ability to include or exclude grouped rows by using the HAVING clause.
64.0	Demonstrate proficiency utilizing subqueries. – The student will be able to:
	64.01 Write a query with an embedded subquery.
	64.02 Evaluate and perform a multiple-column subquery.
	64.03 Describe and explain the behavior of subqueries when null values are retrieved.
	64.04 Create a subquery in a FROM clause.
65.0	Demonstrate proficiency producing readable output with SQL language interface, reporting tool, and data manipulation language. – The student will be able to:
	65.01 Produce queries that require an input variable.
	65.02 Customize the SQL language interface and reporting environment using SET commands for control.
	65.03 Produce more readable output through the use of the column and break commands.

	65.04 Describe data manipulation language (DML) and describe various DML statements.
	65.05 Utilize data manipulation language (DML) through inserting, updating and deleting rows from a table.
	65.06 Control transactions using COMMIT and ROLLBACK statements.
66.0	Demonstrate proficiency creating and managing database objects. – The student will be able to:
	66.01 Describe the main database objects.
	66.02 Create tables and alter their definitions.
	66.03 Describe the data types that can be used when specifying column definition.
67.0	Demonstrate proficiency altering tables and constraints implementing views. – The student will be able to:
	67.01 Create, drop, rename and truncate tables using SQL.
	67.02 Identify and describe various constraints including not null, unique, primary key, foreign key, and check.
	67.03 Create and maintain constraints including adding, dropping, enabling, disabling, and cascading.
	67.04 Recognize views and explain how they are created, how they retrieve data and how they perform DML operations.
68.0	Demonstrate mastery of creating and implementing views, synonyms, indexes and other database objects. – The student will be able to:
	68.01 Create views, retrieve data through a view, alter the definition of a view and drop a view.
	68.02 Categorize information by using Top-N queries to retrieve specified data.
	68.03 Identify the features of a sequence and display sequence values using a data dictionary view.
	68.04 Identify the characteristics of a cached sequence.
	68.05 Modify and remove a sequence using a SQL statement.
	68.06 Identify the features of private and public synonyms.
	68.07 Identify characteristics of an index and describe different types.
	68.08 Create and remove an index using a SQL statement.
69.0	Demonstrate ability to control user access and SQL language interface and reporting tool. – The student will be able to:
	69.01 Identify the features of database security.
	69.02 Create users using SQL statements.

	69.03 Grant and revoke object privileges using a SQL language interface and reporting tool.
70.0	Demonstrate comprehension of bundling features of SQL. – The student will be able to:
	70.01 List and describe the benefits of extension languages to SQL.
	70.02 Recognize the basic SQL block and its sections.
	70.03 Declare SQL variables and describe their significance.
	70.04 Execute a SQL block.
71.0	Demonstrate comprehension working with composite data types by writing executable script files. – The student will be able to:
	71.01 Recognize the significance of the executable section and decide when to use it.
	71.02 Write statements in the executable section.
	71.03 Describe the rules of nested blocks.
	71.04 Identify and utilize appropriate coding conventions.
	71.05 Create a script that will select, insert, and update data in a table.
72.0	Describe the differences between SQL and SQL extension languages. – The student will be able to:
	72.01 Describe SQL extension languages.
	72.02 Differentiate between SQL and SQL extension languages.
	72.03 Explain the need for and benefits of SQL extension languages.
73.0	Create program blocks. – The student will be able to:
	73.01 Describe the structure of a program block.
	73.02 Identify the different types of program blocks.
	73.03 Identify program programming environments.
	73.04 Create and execute an anonymous block.
	73.05 Output messages in program blocks.
74.0	Use variables in program blocks. – The student will be able to:
	74.01 Describe how variables are used in program blocks.

	74.02 Identify the syntax for using variables.
	74.03 Declare and initialize variables.
	74.04 Assign new values to variables.
75.0	Recognize lexical units. – The student will be able to:
	75.01 Describe the types of lexical units.
	75.02 Describe identifiers and identify valid and invalid identifiers.
	75.03 Describe and identify reserved words, delimiters, literals, and comments.
76.0	Recognize data types. – The student will be able to:
	76.01 Describe the data type categories.
	76.02 Give examples of scalar, composite, and large object (LOB) data types.
	76.03 Identify when an object becomes eligible for garbage collection.
77.0	Use scalar data types. – The student will be able to:
	77.01 Declare and use scalar data types.
	77.02 Define guidelines for declaring and initializing variables.
78.0	Use various types of joins. – The student will be able to:
	78.01 Construct and execute SELECT statements using an equijoin.
	78.02 Construct and execute SELECT statements using a non-equijoin.
	78.03 Construct and execute SELECT statements using an outer join.
	78.04 Construct and execute SELECT statements that result in a Cartesian product.
79.0	Use SQL group functions and subqueries. – The student will be able to:
	79.01 Construct and execute an SQL query using group functions to determine a sum total, an average amount, and a maximum value.
	79.02 Construct and execute an SQL query that groups data based on specified criteria.
	79.03 Construct and execute an SQL query that contains a WHERE clause using a single-row subquery.
	79.04 Construct and execute an SQL query that contains a WHERE clause using a multiple-row subquery.

80.0	Write executable statements. – The student will be able to:
	80.01 Construct variable assignment statements.
	80.02 Construct statements using built-in SQL functions.
	80.03 Differentiate between implicit and explicit data type conversions.
	80.04 Describe when implicit data type conversions take place.
	80.05 List the drawbacks of implicit data type conversions.
	80.06 Construct statements using functions to explicitly convert data types.
	80.07 Construct statements using operators.
81.0	Use nested blocks and variable scope. – The student will be able to:
	81.01 Understand the scope and visibility of variables.
	81.02 Write nested blocks and qualify variables with labels.
	81.03 Describe the scope of an exception.
	81.04 Describe the effect of exception propagation in nested blocks.
82.0	Use good programming practices. – The student will be able to:
	82.01 List examples of good programming practices.
	82.02 Insert comments into code.
	82.03 Follow formatting guidelines when writing code.
83.0	Write DML statements to manipulate data. – The student will be able to:
	83.01 Construct and execute a statement to insert data into a table.
	83.02 Construct and execute a statement to update data in a table.
	83.03 Construct and execute a statement to delete data from a table.
	83.04 Construct and execute a statement to merge data into a table.
84.0	Retrieve data. – The student will be able to:
	84.01 Identify SQL statements that can be directly included in an executable block.

	84.02 Construct and execute an INTO clause to hold values returned by a single-row SELECT statement.
	84.03 Construct statements that retrieve data.
85.0	Manipulate data. – The student will be able to:
	85.01 Construct and execute statements that manipulate data with DML statements.
	85.02 Describe when to use implicit or explicit cursors.
	85.03 Create code to use SQL implicit cursor attributes to evaluate cursor activity.
86.0	Use transaction control statements. – The student will be able to:
	86.01 Define a transaction and give an example.
	86.02 Construct and execute a transaction control statement.
87.0	Use IF conditional control statements. – The student will be able to:
	87.01 Construct and use an IF statement.
	87.02 Construct and use an IF-THEN-ELSIF-ELSE statement.
	87.03 Create PL/SQL to handle null conditions in an IF statement.
88.0	Use CASE conditional control statements. – The student will be able to:
	88.01 Construct and use CASE statements.
	88.02 Construct and use CASE expressions.
	88.03 Include syntax to handle null conditions in a CASE statement.
	88.04 Include syntax to handle Boolean conditions in IF and CASE statements.
89.0	Use basic LOOP iterative control statements. – The student will be able to:
	89.01 Describe the types of LOOP statements and their uses.
	89.02 Create a program containing a basic loop and an EXIT statement.
	89.03 Create a program containing a basic loop and an EXIT statement with conditional termination.
90.0	Use WHILE and FOR loop iterative control statements. – The student will be able to:
	90.01 Construct and use the WHILE looping construct.

	90.02 Construct and use the FOR looping construct.
	90.03 Describe when a WHILE loop is used.
	90.04 Describe when a FOR loop is used.
91.0	Use nested loop iterative control statements. – The student will be able to:
	91.01 Construct and execute a program using nested loops.
	91.02 Evaluate a nested loop construct and identify the exit point.
92.0	Use explicit cursors. – The student will be able to:
	92.01 List the guidelines for declaring and controlling explicit cursors.
	92.02 Create code to open a cursor and fetch a piece of data into a variable.
	92.03 Use a simple loop to fetch multiple rows from a cursor.
	92.04 Create code to close a cursor.
93.0	Use explicit cursor attributes. – The student will be able to:
	93.01 Define a record structure.
	93.02 Create code to process the row of an active set using record types in cursors.
	93.03 Use cursor attributes to retrieve information about the state of an explicit cursor.
94.0	Use cursor FOR loops. – The student will be able to:
	94.01 List and explain the benefits of using Cursor FOR loops.
	94.02 Create code to declare a cursor and manipulate it in a FOR loop.
	94.03 Create code containing a Cursor FOR loop using a subquery.
95.0	Use cursors with parameters. – The student will be able to:
	95.01 List the benefits of using parameters with cursors.
	95.02 Create code to declare and manipulate a cursor with a parameter.
96.0	Use cursors for update transactions. – The student will be able to:
	96.01 Create code to lock rows before an update using the appropriate clause.

	96.02 Explain the effect of using NOWAIT in an update cursor declaration.
	96.03 Create code to use the current row of the cursor in an UPDATE or DELETE statement.
97.0	Use multiple cursors. – The student will be able to:
	97.01 Explain the need for using multiple cursors to produce multilevel reports.
	97.02 Create code to declare and manipulate multiple cursors within nested loops.
	97.03 Create code to declare and manipulate multiple cursors using parameters.
98.0	Handle exceptions. – The student will be able to:
	98.01 Describe the advantages of including exception handling code.
	98.02 Describe the purpose of an EXCEPTION section in a program block.
	98.03 Create code to include an EXCEPTION section.
	98.04 List the guidelines for exception handling.
99.0	Trap server exceptions. – The student will be able to:
	99.01 Distinguish between errors defined by the server and those defined by the programmer.
	99.02 Differentiate between errors that are handled implicitly and explicitly by the server.
	99.03 Write code to trap a predefined server error.
	99.04 Write code to trap a non-predefined server error.
	99.05 Write code to identify an exception by error code and by error message.
100.0	Trap user-defined exceptions. – The student will be able to:
	100.01 Write code to name a user-defined exception.
	100.02 Write code to raise an exception.
	100.03 Write code to handle a raised exception.
101.0	Create procedures. – The student will be able to:
	101.01 Differentiate between anonymous blocks and subprograms.
	101.02 Identify the benefits of using subprograms.

	101.03 Describe a stored procedure.
	101.04 Create a procedure.
	101.05 Describe how a stored procedure is invoked.
102.0	Use parameters in procedures. – The student will be able to:
	102.01 Describe how parameters contribute to a procedure.
	102.02 Define a parameter.
	102.03 Create a procedure using a parameter.
	102.04 Invoke a procedure that has parameters.
	102.05 Distinguish between formal and actual parameters.
103.0	Pass parameters. – The student will be able to:
	103.01 List the types of parameter modes.
	103.02 Create a procedure that passes parameters.
	103.03 Identify methods for passing parameters.
	103.04 Describe the default option for parameters.
104.0	Create stored functions. – The student will be able to:
	104.01 Describe the difference between a stored procedure and a stored function.
	104.02 Create a program block containing a function.
	104.03 Identify ways in which functions may be invoked.
	104.04 Create a program block that invokes a function that has parameters.
105.0	Use functions in SQL statements. – The student will be able to:
	105.01 Describe where user-defined functions can be called from within an SQL statement.
	105.02 Describe the restrictions on calling functions from SQL statements.
	105.03 Describe the purpose of the Data Dictionary.
	105.04 Differentiate between the three types of Data Dictionary views.

	105.05 Write SQL SELECT statements to retrieve information from the Data Dictionary.
106.0	Manage procedures and functions. – The student will be able to:
	106.01 Describe how exceptions are propagated.
	106.02 Remove a function and a procedure.
	106.03 Use Data Dictionary views to identify and manage stored procedures.
107.0	Manage object privileges. – The student will be able to:
	107.01 List and explain several object privileges.
	107.02 Explain the function of the EXECUTE object privilege.
	107.03 Write SQL statements to grant and revoke object privileges.
108.0	Use invoker's rights. – The student will be able to:
	108.01 Contrast invoker's rights with definer's rights.
	108.02 Create a procedure that uses invoker's rights.
109.0	Create packages. – The student will be able to:
	109.01 Describe a package, its components, and the reasons for use.
	109.02 Create packages containing related variables, cursors, constants, exceptions, procedures, and functions.
	109.03 Create a program block that invokes a package construct.
110.0	Manage package constructs. – The student will be able to:
	110.01 Explain the difference between public and private package constructs.
	110.02 Designate a package construct as either public or private.
	110.03 Specify the syntax to drop a package.
	110.04 Identify Data Dictionary views used to manage packages.
	110.05 Identify the guidelines for using packages.
111.0	Use advanced package concepts. – The student will be able to:
	111.01 Write packages that use the overloading feature.

111.02	Write packages that use forward declarations.
111.03	Explain the purpose of a package initialization block.
111.04	Identify restrictions on using packaged functions in SQL statements.
112.0	Manage persistent state of package variables. – The student will be able to:
112.01	Identify persistent states of package variables.
112.02	Control the persistent state of a package cursor.
113.0	Use vendor-supplied packages. – The student will be able to:
113.01	Describe two common uses for vendor-supplied packages.
113.02	Use the syntax to specify messages for a vendor-supplied package.
113.03	Identify the exceptions used in conjunction with vendor-supplied packages.
114.0	Understand dynamic SQL. – The student will be able to:
114.01	Identify the stages through which all SQL statements pass.
114.02	Describe the reasons for using dynamic SQL to create an SQL statement.
114.03	List statements supporting Native Dynamic SQL.
115.0	Understand triggers. – The student will be able to:
115.01	Describe database triggers and their uses.
115.02	Differentiate between a database trigger and an application trigger.
115.03	List the guidelines for using triggers.
115.04	Compare and contrast database triggers and stored procedures.
116.0	Create DML triggers. – The student will be able to:
116.01	Create a DML trigger and identify its components.
116.02	Create a statement level trigger.
116.03	Describe the trigger firing sequence options.
116.04	Create a DML trigger that uses conditional predicates.

	116.05 Create a row level trigger.
	116.06 Create a row level trigger that uses OLD and NEW qualifiers.
	116.07 Create an INSTEAD OF trigger.
117.0	Create DDL and database event triggers. – The student will be able to:
	117.01 Describe the events that cause DDL and database event triggers to fire.
	117.02 Create a trigger for a DDL statement.
	117.03 Create a trigger for a database event.
	117.04 Describe the functionality of the CALL statement.
	117.05 Describe the cause of a mutating table.
118.0	Manage triggers. – The student will be able to:
	118.01 View trigger information in the Data Dictionary.
	118.02 Disable and enable a database trigger.
	118.03 Remove a trigger from the database.
119.0	Use large object data types. – The student will be able to:
	119.01 Compare and contrast LONG and LOB data types.
	119.02 Describe LOB data types and how they are used.
	119.03 Differentiate between internal and external LOBs.
	119.04 Create and maintain LOB data types.
	119.05 Migrate data from LONG to LOB.
120.0	Manage binary types. – The student will be able to:
	120.01 Define binary column data type.
	120.02 Create directory objects and view them in the Data Dictionary.
	120.03 Manage and manipulate binary types.
121.0	Manage indexes. – The student will be able to:

121.01	Create and manipulate user-defined records.
121.02	Create an index.
121.03	Describe the difference between records, tables, and indexes.
122.0	Manage dependencies. – The student will be able to:
122.01	Describe the implications of procedural dependencies.
122.02	Contrast dependent objects and referenced objects.
122.03	View dependency information in the Data Dictionary.
122.04	Use a script to create the objects required to display dependencies.
122.05	Use views to display dependencies.
122.06	Describe how to minimize dependency failures.
123.0	Program a database application. – The student will be able to:
123.01	Utilize loop statements.
123.02	Given a scenario, use arithmetic, comparison, and pattern-matching operators.
123.03	Create user-defined functions.
123.04	Utilize common built-in functions.
123.05	Declare variables in modules and procedures.
123.06	Declare arrays, and initialize elements of arrays.
123.07	Declare and use object variables and collections, and use their associated properties and methods.
123.08	Declare symbolic constants, and make them available locally or publicly.
123.09	Respond to events.
124.0	Utilize the basic concepts of database design. – The student will be able to:
124.01	Apply basic concepts of normalization.
124.02	Utilize the cascade update and cascade delete options.
125.0	Utilize SQL and union queries. – The student will be able to:

	125.01 Utilize SQL to write common queries.
	125.02 Refer to objects by using SQL.
	125.03 Utilize union queries.
126.0	Implement program statements using objects. – The student will be able to:
	126.01 Determine when to use data access objects.
	126.02 Differentiate between objects and collections.
	126.03 Write statements that access and modify database objects.
	126.04 Utilize data access objects.
	126.05 Select appropriate methods and property settings for use with specified objects.
127.0	Utilize debugging tools and write error handlers. – The student will be able to:
	127.01 Trap errors.
	127.02 Utilize debugging tools to suspend program execution, and to examine, step through, and reset execution of code.
	127.03 Debug code samples.
	127.04 Utilize the Debugger to monitor variable values.
	127.05 Write an error handler.
128.0	Demonstrate file I/O. – The student will be able to:
	128.01 Read from files.
	128.02 Write to files.
	128.03 Utilize record locking.
129.0	Create forms and identify all the properties of a form. – The student will be able to:
	129.01 Choose form-specific and report-specific properties to set.
	129.02 Choose control properties to set.
	129.03 Assign event-handling procedures to controls in a form.
	129.04 Define and create form and report modules.

	129.05 Identify the scope of a form or report module.
	129.06 Open multiple instances of a form, and refer to them.
	129.07 Assign values to form properties.
	129.08 Use form methods.
130.0	Manipulate data using object models. – The student will be able to:
	130.01 Connect to a data source.
	130.02 Open a recordset.
	130.03 Insert, update, delete and find data.
131.0	Develop custom controls. – The student will be able to:
	131.01 Set properties for custom controls.
	131.02 Customize user interface controls.
132.0	Utilize API functions. – The student will be able to:
	132.01 Properly declare functions.
	132.02 Use the by value and by reference parameters.
133.0	Demonstrate database replication and implement database replication using programming tools. – The student will be able to:
	133.01 Make a database replicable.
	133.02 View a synchronization schedule.
	133.03 Explain how synchronization conflicts are resolved.
	133.04 Identify the advantages of using replication of synchronization.
	133.05 Identify the changes that the database engine makes when it converts a nonreplicable database into replicable database.
134.0	Analyze and implement security options. – The student will be able to:
	134.01 Analyze a scenario, and recommend an appropriate type of security.
	134.02 Explain the steps for implementing security.
	134.03 Analyze code to ensure that it sets security options.

	134.04 Write code to implement security options.
135.0	Implement client/server applications. – The student will be able to:
	135.01 Demonstrate SQL pass through queries and application queries.
	135.02 Access external data.
	135.03 Trap errors that are generated by the server.
	135.04 Optimize connections.
	135.05 Optimize performance for a given client/server application.
136.0	Optimize the performance of a database. – The student will be able to:
	136.01 Differentiate between single-field and multiple-field indexes.
	136.02 Optimize queries.
	136.03 Restructure queries to allow faster execution.
	136.04 Optimize performance in distributed applications.
	136.05 Optimize performance for client/server applications.
137.0	Perform application distribution. – The student will be able to:
	137.01 Prepare an application for distribution.
	137.02 Analyze various methods to distribute a client/server application.
	137.03 Distribute custom controls with an application.
	137.04 Provide online help.
138.0	Test and debug databases. – The student will be able to:
	138.01 Implement error handling.
	138.02 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 comprising the Software Development Core. Secondary or postsecondary students who have previously completed the Software Development Core will not have to repeat the core. 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.

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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Design a computer program to meet specific physical, operational, and interaction criteria.
27.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
28.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
29.0 Create a unit test plan, implement the plan, and report the results of testing.
30.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
31.0 Solve problems using critical thinking skills, creativity and innovation.
32.0 Use information technology tools.
33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.

34.0 Describe the importance of professional ethics and legal responsibilities.
35.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
36.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
37.0 Design, document, and create object-oriented computer programs.
38.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
39.0 Develop an awareness of the changes taking place in the information age and how they fit into an evolving society.
40.0 Understand .NET primitive data types and their uses.
41.0 Describe the types and characteristics of lexical units in the .NET programming language.
42.0 Construct statements that use various .NET operators.
43.0 Construct and use .NET selection control structures.
44.0 Construct and use .NET iterative control structures.
45.0 Construct and use .NET structures for error handling.
46.0 Write .NET programs that define and use user-defined data types, including classes.
47.0 Write .NET programs that define and use methods.
48.0 Write programs that perform console input and output in a .NET program.
49.0 Use namespaces in a .NET program.
50.0 Use arrays in .NET programs.
51.0 Write .NET programs that use the object-oriented concept of inheritance.
52.0 Write .NET programs that use the object-oriented concept of polymorphism.
53.0 Write .NET programs that use the object-oriented concept of encapsulation.
54.0 Apply common programming style guidelines and conventions.
55.0 Use application life cycle management to develop and maintain .NET programs.
56.0 Use nullable values in a .NET program.
57.0 Use the .NET String and StringBuilder classes in an application.
58.0 Use .NET classes to perform stream input/output.
59.0 Use recursive functions to solve problems in .NET programs.
60.0 Write .NET programs that use interfaces.
61.0 Use .NET collections in applications.
62.0 Demonstrate knowledge of different types of .NET applications.
63.0 Demonstrate knowledge of .NET architecture and tools.
64.0 Demonstrate knowledge of Web applications.
65.0 Develop Web pages using HTML, CSS, JavaScript, and ASP.NET.
66.0 Develop .NET Windows Form applications.
67.0 Develop Windows Service applications and class libraries.
68.0 Demonstrate knowledge of database applications.
69.0 Demonstrate knowledge of structured query language (SQL) statements.
70.0 Develop .NET database applications.
71.0 Successfully work as a member of a software development team.
72.0 Manage time according to a plan.
73.0 Keep acceptable records of progress problems and solutions.
74.0 Plan, organize, and carry out a project plan.
75.0 Manage resources.

76.0 Use tools, materials, and processes in an appropriate and safe manner.
77.0 Demonstrate an understanding of the software development process.
78.0 Research content related to the project and document the results following industry conventions.
79.0 Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience.
80.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
05.0	Use database and spreadsheet applications. – The student will be able to:	
	05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating

	the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.

	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
	12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.

	12.09 Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
	13.01 Identify elements of a Web page.
	13.02 Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
	13.03 Define basic HTML terminology.
	13.04 Analyze HTML source code developed by others.
	13.05 Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
	13.06 Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
	13.07 Edit and test HTML documents for accuracy and validity.
	13.08 Use basic functions of WYSIWYG editors.
	13.09 Use basic functions of HTML, DHTML, and XML editors and converters.
	13.10 Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
	14.01 Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
	14.02 Describe and apply color theory as it applies to Web page design (e.g., background and text color).
	14.03 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	14.04 Use image design software to create and edit images.
	14.05 Demonstrate proficiency in publishing to the Internet.
	14.06 Demonstrate proficiency in adding downloadable forms to web pages.
	14.07 Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
	15.01 Compare and contrast various methods of evaluation for emerging technologies.
	15.02 Demonstrate knowledge of the process of planning upgrades and changeovers.
	15.03 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).

16.0	Demonstrate proficiency using common software applications. – The student will be able to:
16.01	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).
16.02	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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
17.01	Identify operating system file naming conventions.
17.02	Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
17.03	Demonstrate a working knowledge of standard file formats.
17.04	Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
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.
18.02	Identify tasks performed by programmers.
18.03	Describe how businesses use computer programming to solve business problems.
18.04	Investigate job opportunities in the programming field.
18.05	Explain different specializations and the related training in the computer programming field.
18.06	Explain the need for continuing education and training of computer programmers.
18.07	Explain enterprise software systems and how they impact business.
18.08	Describe ethical responsibilities of computer programmers.
18.09	Describe the role of customer support to software program quality.
18.10	Identify credentials and certifications that may improve employability for a computer programmer.
18.11	Identify devices, tools, and other environments for which programmers may develop software.
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.
19.02	Explain the types and uses of variables in programs.
19.03	Determine the best data type to use for given programming problems.
19.04	Identify the types of operations that can be performed on different data types.
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.
19.06	Explain how computers store different data types in memory.
19.07	Use different number systems to represent data.
19.08	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.

	19.09 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.
	20.02 Explain iterative programming structures (e.g., while, do/while) and their uses.
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.
	21.02 Identify the characteristics, uses, and limits of high-level programming languages.
	21.03 Identify the characteristics, uses, and limits of rapid development programming languages.
	21.04 Describe object-oriented concepts.
	21.05 Explain the characteristics of procedural and object-oriented programming languages.
	21.06 Compare and contrast programming languages that are compiled (e.g., C++), interpreted (e.g., Basic, HTML), and translated (e.g., Java).
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.
	22.02 Describe the stages of the program life cycle.
	22.03 Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).
	22.04 List and explain the steps in the program development cycle.
	22.05 Describe different types of documentation used in the program development cycle (e.g., requirements document, program design documents, test plans).
	22.06 Describe the on-going need for program maintenance.
	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).
	22.08 Describe different methods used to facilitate version control and change management.
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.
	23.02 Explain testing performed at different stages of the program development cycle (e.g. unit testing, system testing, user acceptance testing).

23.03	Describe data and the use of test plans/scripts to be used in program testing.
23.04	Describe and identify types of programming errors (e.g., syntactical, logic, usability, requirements mismatch).
23.05	Identify the data to be used for boundary conditions.
23.06	Explain different types of testing (e.g., usability, automated, regression) and testing tools.
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).
24.02	Describe tools for developing a program design (e.g., UML, flowcharts, design documents, pseudocode).
24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.
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).
24.05	Write a program design document using UML or other standard design methodology.
24.06	Define input and output for a program module using UML or other standard design methodology.
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.
25.02	Identify different types of threats to computer systems.
25.03	Identify methods to protect against different threats to computer systems.
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).
26.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:
26.01	Choose appropriate data types depending on the needs of the program.
26.02	Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).
26.03	Design and develop program that are designed for efficiency (e.g., less memory usage, less inputs/outputs, faster processing).
26.04	Identify the software environment required for a program to run (e.g., operating system required, mobile, Web-based, desktop, delivery method).
26.05	Identify the tools required to develop a program (e.g., editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).

27.0	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:
	27.01 Use appropriate naming conventions to define program variables and modules (methods, functions).
	27.02 Use a program editor to write the source code for a program.
	27.03 Write programs that use selection structures (e.g., if, if/else).
	27.04 Write programs that use repetition structures (e.g., while, do/while).
	27.05 Write programs that use nested structures.
	27.06 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.
	27.07 Compile and run programs.
	27.08 Write programs that use standard arithmetic operators with different numerical data types.
	27.09 Write programs that use standard logic operators.
	27.10 Write programs that use a variety of common data types.
	27.11 Write programs that perform data conversion between standard data types.
	27.12 Write programs that define, use, search, and sort arrays.
	27.13 Write programs that use user-defined data types.
	27.14 Demonstrate understanding and use of appropriate variable scope.
28.0	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:
	28.01 Write programs that perform user input and output.
	28.02 Write programs that validate user input (e.g., range checking, data formats, valid/invalid characters).
	28.03 Write program modules such as functions, subroutines, or methods.
	28.04 Write program modules that accept arguments.
	28.05 Write program modules that return values.
	28.06 Write program modules that validate arguments and return error codes.
	28.07 Write interactive programs.

	28.08 Write programs that use standard libraries to enhance program function.
	28.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
29.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	29.01 Write a unit test plan that identifies the input data and expected results for program tests.
	29.02 Test and debug programs, including programs written by others.
	29.03 Write a test report that identifies the results of testing.
	29.04 Trace through the function of a program to ensure valid operation.
	29.05 Identify the system resources used by the program (e.g., memory, disk space, execution time, external devices).
	29.06 Create a disaster / emergency response plan for a computer system.
30.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	30.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	30.02 Locate, organize and reference written information from various sources.
	30.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	30.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	30.05 Apply active listening skills to obtain and clarify information.
	30.06 Develop and interpret tables and charts to support written and oral communications.
	30.07 Exhibit public relations skills that aid in achieving customer satisfaction.
31.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	31.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	31.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	31.03 Identify and document workplace performance goals and monitor progress toward those goals.
	31.04 Conduct technical research to gather information necessary for decision-making.
32.0	Use information technology tools. – The student will be able to:
	32.01 Use personal information management (PIM) applications to increase workplace efficiency.

	32.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	32.03 Employ computer operations applications to access, create, manage, integrate, and store information.
	32.04 Employ collaborative/groupware applications to facilitate group work.
33.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
	33.01 Employ leadership skills to accomplish organizational goals and objectives.
	33.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	33.03 Conduct and participate in meetings to accomplish work tasks.
34.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
	34.01 Evaluate and justify decisions based on ethical reasoning.
	34.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	34.03 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**	
35.0	Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:
35.01	Demonstrate the understanding and use of classes, objects, attributes, and behaviors.
35.02	Demonstrate the understanding and use of inheritance.
35.03	Demonstrate the understanding and use of data encapsulation.
35.04	Demonstrate the understanding and use of polymorphism.
36.0	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:
36.01	Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.
36.02	Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.
36.03	Design an object-oriented program using UML or another standard design methodology.
36.04	Work with other team members to develop a project plan for a program.
36.05	Work with other team members to write a design document for a program with multiple functions and shared data.
36.06	Participate in design meetings that review program design documents for conformance to program requirements.
36.07	Estimate the time to develop a program or module.
37.0	Design, document, and create object-oriented computer programs. – The student will be
37.01	Compare and contrast recursive functions to other iterative methods.
37.02	Understand the implementation of character strings in the programming language.
37.03	Write programs that perform string processing (e.g., string manipulation, string compares, concatenation).
37.04	Write programs that use user-defined data types.
37.05	Write object-oriented programs that use inheritance.
37.06	Write object-oriented programs that use polymorphism.
37.07	Develop class constructors.

	37.08	Write programs that define and use program constants.
	37.09	Write programs that perform error handling.
	37.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.
	37.11	Write programs that perform dynamic memory allocation.
	37.12	Write programs that perform effective management of dynamically allocated memory.
	37.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal and external) related to version control.
	37.14	Write programs that use complex data structures (e.g., stacks, queues, trees, linked lists).
	37.15	Write programs that are event-driven.
	37.16	Write programs that perform file input and output (i.e., sequential and random access file input/output).
	37.17	Perform basic database commands including connect, open, select, and close.
38.0	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:	
	38.01	Develop a test plan for an object-oriented program.
	38.02	Write test plans for event-driven programs.
	38.03	Write test plans for programs that perform file input and output.
	38.04	Perform test and debug activities on object-oriented programs, including those written by someone else.
	38.05	Perform test and debug activities on an event-driven program.
	38.06	Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.
	38.07	Document the findings of testing in a test report.

Course Number: CTS0032 **Occupational Completion Point: D** **.NET Programmer – 450 Hours – SOC Code 15-1131**	
39.0	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:
39.01	Cite examples of jobs, salary, and opportunities he/she will have as a .NET programmer.
39.02	Describe the role a database plays in a business.
39.03	Explain the value of middleware, such as the .NET framework, in developing software applications.
39.04	Understand the importance of clear communication when discussing business informational requirements.
40.0	Understand .NET primitive data types and their uses. – The student will be able to:
40.01	Describe how variables are used in programs.
40.02	Identify the .NET built-in value types, their uses, and the ranges of values supported by each type.
40.03	Identify the default values for built-in value types.
40.04	Write statements that declare and initialize variables.
40.05	Write statements that assign literal values to numeric types.
40.06	Identify the .NET built-in reference types.
40.07	Write statements that assign string literals to string types.
40.08	Explain the memory size requirements for the various data storage types.
40.09	Identify which types are stored on the heap and which are stored on the stack.
40.10	Identify which data type should be used for a given purpose in a program.
40.11	Write statements that create variables with values that cannot be changed (i.e., const, final).
40.12	Identify the syntax for declaring and initializing each of the built-in data types.
40.13	Differentiate between implicit and explicit data type conversions.
40.14	Describe when implicit data type conversions take place.
40.15	Write statements that use explicit type conversion.
40.16	List the drawbacks of implicit data type conversions.

	40.17 Compare and contrast boxing and unboxing.
	40.18 Describe the scope of a variable.
	40.19 Describe how the compiler uses scope to distinguish between variables with the same name.
41.0	Describe the types and characteristics of lexical units in the .NET programming language. – The student will be able to:
	41.01 Describe the types of lexical units (e.g., keywords, directives, operators).
	41.02 Describe identifiers and identify valid and invalid identifiers.
	41.03 Describe and identify reserved words, delimiters, literals, and comments.
42.0	Construct statements that use various .NET operators. – The student will be able to:
	42.01 Construct statements using arithmetic operators.
	42.02 Construct statements using relational operators.
	42.03 Construct and use statements using logical operators.
	42.04 Construct and use statements using assignment operators.
	42.05 Construct and execute statements using operator precedence.
	42.06 Construct and execute statements using methods and fields of the Math class.
43.0	Construct and use .NET selection control structures. – The student will be able to:
	43.01 Construct and use an if structure in a program.
	43.02 Construct and use an if/else structure in a program.
	43.03 Construct and use multiple-selection structures (e.g., switch, elseif, select) in programs.
	43.04 Construct and use nested selection structures in a program.
	43.05 Construct and use a conditional operator.
44.0	Construct and use .NET iterative control structures. – The student will be able to:
	44.01 Describe the types of iterative control structures and their uses.
	44.02 Construct and use a while structures (e.g., while, do/while, do/until) in a program.
	44.03 Construct and use a for structure in a program.

44.04	Construct and use a control structure that iterates over each item in a collection (e.g., foreach, for/each/next).
44.05	Describe the limits and advantages of different iterative control structure (i.e., while, do/while, for, foreach or for/each).
44.06	Construct and use nested structures (iterative and selective) in a program.
44.07	Write programs that alter the execution of program loops (e.g., break, continue, exit).
45.0	Construct and use .NET structures for error handling. – The student will be able to:
45.01	Describe the different types of software errors.
45.02	Compare and contrast alternatives for handling errors.
45.03	Write programs that validate user input and handle errors.
45.04	Explain the correct method for using multiple catch blocks for exceptions.
45.05	Explain the purpose of the finally block in exception handling.
45.06	Write programs that handle exceptions using the try/catch/finally structure.
45.07	Write programs with nested exception handling.
45.08	Explain the concept of structured exception handling.
45.09	Identify common exceptions and their causes.
45.10	Explain the concept of throwing a new exception.
45.11	Write programs that catch and re-throw exceptions.
45.12	Write exception handlers that use characteristics of the exception argument in the program.
46.0	Write .NET programs that define and use user-defined data types, including classes. – The student will be able to:
46.01	Explain the concept of a user-defined data type.
46.02	Distinguish between structures and classes.
46.03	Identify the syntax for declaring enumerations and structures.
46.04	Write programs that use declare and use enumerations.
46.05	Write programs that declare and use structures.
46.06	Explain the characteristics of different class constructs including instance variables, properties, fields, methods, events, object references, and constructors.

	46.07 Write programs that declare and use classes.
	46.08 Distinguish between different types of classes, including base class, derived class, abstract class, and sealed class.
	46.09 Explain the impact of using different access modifiers on user-defined data types.
	46.10 Use access modifiers in a program to control visibility to variables and user-defined data types.
	46.11 Explain the this reference and its uses.
47.0	Write .NET programs that define and use methods. – The student will be able to:
	47.01 Identify the benefits of using methods.
	47.02 Describe the different types of class methods and their purposes.
	47.03 Create class methods that do and do not return values.
	47.04 Write statements that invoke a method.
	47.05 Create a method using arguments.
	47.06 Invoke a method that has arguments.
	47.07 Describe a method signature.
	47.08 Describe the purpose of overloading methods.
	47.09 Write programs that have overloaded methods.
	47.10 Define methods that have default arguments.
	47.11 Describe the conflict between overloaded methods and default arguments.
	47.12 Explain the impact of using different access modifiers on class methods.
	47.13 Write methods that use argument modifiers (e.g., out, ref, byref, byval, const).
48.0	Write programs that perform console input and output in a .NET program. – The student will be able to:
	48.01 Use the Console class to read and write data from the console.
	48.02 Write statements that use escape sequences.
	48.03 Write statements that format string and numeric output.
	48.04 Write statements that use the ToString method to output data.

49.0	Use namespaces in a .NET program. – The student will be able to:
49.01	Compare and contrast assemblies and namespaces.
49.02	Describe the use of namespaces in .NET programming.
49.03	Describe commonly used .NET namespaces (e.g., System, System.IO, System.Collections, System.Drawing).
49.04	Identify the correct namespace to include for specified classes.
49.05	Write programs that define a namespace.
49.06	Create namespaces that abide by standard naming convention.
50.0	Use arrays in .NET programs. – The student will be able to:
50.01	Write statements to declare and initialize an array.
50.02	Demonstrate the use of initializer lists.
50.03	Write methods that take an array as an argument.
50.04	Write methods that return an array to the calling method.
50.05	Write statements to update, and destroy arrays.
50.06	Explain linear and binary searching.
50.07	Use the static methods of the Array class to perform searches, binary searches, and sorts.
50.08	Demonstrate the use of multidimensional arrays.
50.09	Demonstrate the use of jagged arrays (array of arrays).
51.0	Write .NET programs that use the object-oriented concept of inheritance. – The student will be able to:
51.01	Explain the purpose and use of inheritance in object oriented programming.
51.02	Compare and contrast single and multiple inheritance.
51.03	Explain the purpose and implementation of classes that cannot serve as a base class (a sealed class).
51.04	Describe has-a and is-a relationships.
51.05	Create class hierarchies using inheritance.
51.06	Declare and use a class derived from another class (implementing an is-a relationship).

	51.07 Declare and use a class where the derived class overrides methods of the base class.
	51.08 Declare and use a class that contains another class as a data member (implementing a has-a relationship).
	51.09 Write statements that determine at run time whether an instance of a class is derived from a specific base class or interface.
	51.10 Write statements that invoke a method of the base class from a derived class.
	51.11 Identify which class methods can be inherited and which cannot.
	51.12 Explain how access modifiers affect the inheritance of class variables and methods.
52.0	Write .NET programs that use the object-oriented concept of polymorphism. – The student will be able to:
	52.01 Explain the purpose and implementation of classes that cannot be instantiated (an abstract class).
	52.02 Explain the purpose and implementation of virtual class methods that must be overridden by derived classes.
	52.03 Explain the use of abstract classes in enforcing polymorphism.
	52.04 Create an abstract class.
	52.05 Create classes that derive from an abstract class.
	52.06 Create a program that uses polymorphism.
53.0	Write .NET programs that use the object-oriented concept of encapsulation. – The student will be able to:
	53.01 Define and use classes that use access modifiers (e.g., private, public, protected, internal, internal protected) to provide encapsulation of data.
	53.02 Explain the restrictions on using accessibility levels.
	53.03 Compare and contrast different types of variable scope, including block, procedure, module/class, and project scope.
	53.04 Compare and contrast different types of method scope, including public, private, protected, friend, and protectedfriend.
	53.05 Write programs that use local variables.
	53.06 Describe the scope of a given variable.
	53.07 Describe how the compiler uses scope to distinguish between variables with the same name.
	53.08 Explain the purpose and use of static classes, variables and methods.
	53.09 Write programs that create and use static classes, variables, and methods.
54.0	Apply common programming style guidelines and conventions. – The student will be able to:

54.01	List examples of good programming practices.
54.02	Insert comments into code.
54.03	Follow formatting guidelines when writing code.
54.04	Define guidelines for declaring and initializing variables.
55.0	Use application life cycle management to develop and maintain .NET programs. – The student will be able to:
55.01	Describe the stages in the life cycle of an application.
55.02	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.
55.03	Describe how the needs of the customer affect the development of an application.
55.04	Describe the different types of testing that are performed on an application.
55.05	Describe the role of tools such as UML (Unified Modeling Language) in ensuring the integrity of the application.
55.06	Describe different types of UML diagrams and guidelines for their use.
55.07	Develop a class based on its description in a UML diagram.
55.08	Read an application specification and translate it into a working program.
55.09	Describe the characteristics of different types of application development (e.g., Agile development).
55.10	Compare and contrast different methodologies for application development (e.g., Scrum, XP, Crystal, FDD, and DSDM).
55.11	Describe different methods for deploying applications.
56.0	Use nullable values in a .NET program. – The student will be able to:
56.01	Describe the use of nullable value types.
56.02	Describe the use of the null value in .NET programs.
56.03	Write statements to declare and initialize nullable value types.
56.04	Write statements to determine if a nullable value type currently has a value.
57.0	Use the .NET String and StringBuilder classes in an application. – The student will be able to:
57.01	Compare and contrast the String and StringBuilder classes.
57.02	Identify the performance implications of using the String and StringBuilder classes for different purposes.

	57.03 Use the methods of the String class to compare, search, format, split and join strings.
	57.04 Use the methods of the String and StringBuilder classes to find, replace, delete, and insert substrings.
	57.05 Use the methods of the String class to translate a string into uppercase or lowercase.
	57.06 Use culture information to modify strings.
58.0	Use .NET classes to perform stream input/output. – The student will be able to:
	58.01 Compare and contrast .NET classes used to perform file input/output (e.g., StreamReader, StreamWriter, StringReader, StringWriter, MemoryStream, BinaryReader, BinaryWriter).
	58.02 Compare and constrast .NET classes used to manipulate files and directories (e.g., Directory, DirectoryInfo, File, FileInfo, Path).
	58.03 Use .NET classes to search, add, and delete directories.
	58.04 Use .NET classes to search, add, and delete files.
	58.05 Use .NET classes to read and write text to a file.
	58.06 Use .NET classes to read and write objects of a variety of types to a file.
	58.07 Use .NET classes to read and write binary data to a file.
	58.08 Compare and contrast .NET classes used to compress data (e.g., GZipStream, DeflateStream).
	58.09 Use .NET classes to read and write compressed data to a file.
59.0	Use recursive functions to solve problems in .NET programs. – The student will be able to:
	59.01 Describe the use of recursive methods in solving problems.
	59.02 Describe the difference of iterative and recursive methods.
	59.03 Demonstrate the use of direct recursion.
	59.04 Demonstrate the use of indirect recursion.
60.0	Write .NET programs that use interfaces. – The student will be able to:
	60.01 Describe interfaces and their use in .NET programming.
	60.02 Declare and use a class that implements a standard interface.
	60.03 Compare and contrast inheritance from a base class and inheritance of an interface.
	60.04 Identify common interfaces and their purposes (e.g., IComparable, IComparer, IEquatable, IDisposable, IFormattable, IConvertible).

	60.05 Define and use a custom interface.
	60.06 Write classes that implement common interfaces (e.g., IComparable, IComparer, IEquatable, IDisposable, IFormattable, IConvertible).
	60.07 Describe the program to interface principle and its benefits.
61.0	Use .NET collections in applications. – The student will be able to:
	61.01 Compare and contrast common non-generic collection classes, including ArrayList, BitArray, HashTable, Queue, and Stack.
	61.02 Write programs that use common non-generic collection classes.
	61.03 Compare and contrast non-generic collection classes to generic collection classes.
	61.04 Compare and contrast common generic collection classes, including Dictionary, LinkedList, Queue, SortedDictionary, SortedList, and Stack.
	61.05 Write programs that use common generic collection classes.
	61.06 Identify the collection class that is the best choice for different application requirements.
	61.07 Use iterators to access individual members of different types of collections.
	61.08 Use standard methods to add, delete, and modify members of different types of collections.
	61.09 Write statements to access members of a dictionary based on a key.
	61.10 Write statements to determine the existence of members of a dictionary based on a key or a value.
62.0	Demonstrate knowledge of different types of .NET applications. – The student will be able to:
	62.01 Compare and contrast different types of .NET applications (e.g., Console, Windows Form, WPF, Windows Service, Class Library, Web, and database).
	62.02 Choose the best type of application to develop for a given application scenario.
	62.03 Describe the characteristics and capabilities of a console application.
	62.04 Develop, test, and debug a console application.
	62.05 Write a console application that uses command-line arguments.
63.0	Demonstrate knowledge of .NET architecture and tools. – The student will be able to:
	63.01 Describe components of the .NET architecture, including the Common Language Runtime (CLR), just-in-time (JIT) compiler, intermediate language (IL).
	63.02 Describe the steps required for a managed assembly to be built and run in the .NET environment.

63.03	Compile single-file and multi-file assemblies using command-line tools.
63.04	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.
63.05	Use a signing tool to sign an assembly.
63.06	Use a disassembly tool to view the classes, members, and methods of an assembly.
63.07	Describe the garbage collection process.
64.0	Demonstrate knowledge of Web applications. – The student will be able to:
64.01	Describe the Web as a platform for applications.
64.02	Compare and contrast static and dynamic content.
64.03	Describe how Web pages are loaded to a computer from the Internet including the hardware, software, servers, and protocols required.
64.04	Compare and contrast server-side and client-side programming.
64.05	Describe how a Web browser downloads and renders a Web page.
64.06	Describe options and methodology for Web site deployment.
64.07	Compare and contrast different Web development technologies, including HTML, CSS, JavaScript, CGI scripts, XML, and ASP.NET.
64.08	Describe common Web page terminology (e.g., page life cycle, the Web page event model, Web Page state management, cookies, virtual directories).
64.09	Define the steps in the page life cycle of an ASP.NET Web page.
64.10	Describe state management as it related to maintenance of page information.
64.11	Describe how Web services are accessed from a client application.
64.12	Describe the PostBack mechanism for posting data to a Web page using ASP.NET.
64.13	Describe the role of Internet Information Services (IIS).
64.14	Describe the role of Internet Service Providers (ISP) and the services they provide.
64.15	Describe Web services and related tools (e.g., Extensible Markup Language (XML), Simple Object Access Protocol (SOAP) and Web Service Definition Language (WSDL)).
64.16	Describe the characteristics and purposes of Application objects and Session objects that are maintained by the ASP.NET run-time engine.
64.17	Describe the common ASP.NET events for applications and sessions (i.e., application start, application end, application error, session start, session end).

64.18	Describe entities that define standards for Internet applications (e.g., WS3, OASIS, WS-I).
65.0	Develop Web pages using HTML, CSS, JavaScript, and ASP.NET. – The student will be able to:
65.01	Describe the characteristics and capabilities of a Web application.
65.02	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.
65.03	Develop Web pages using CSS (cascading style sheets) to define a uniform appearance across multiple Web pages.
65.04	Develop Web pages using JavaScript to define and implement interactive content.
65.05	Define and use functions in JavaScript.
65.06	Define and use local and global variables using JavaScript.
65.07	Use conditional operators in JavaScript to selectively perform specific function.
65.08	Use Boolean conditions in JavaScript to selectively perform with multiple conditions.
65.09	Use JavaScript loops to perform iteration.
65.10	Use string objects and escape sequences in a JavaScript.
65.11	Use JavaScript to access, use, and modify HTML elements.
65.12	Use JavaScript to handle common events, including mouse events, key events, and page events.
65.13	Use JavaScript to create and manage forms within a Web page.
65.14	Develop Web pages that use ASP.NET to provide interactivity.
65.15	Describe standards for making Web pages accessible to individuals with disabilities.
65.16	Develop Web pages that conform to accessibility standards.
66.0	Develop .NET Windows Form applications. – The student will be able to:
66.01	Describe the characteristics and capabilities of a Windows Forms application.
66.02	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).
66.03	Develop an interactive Windows Forms application that uses a variety of objects for input and output.
66.04	Perform data validation on input fields.
66.05	Describe the Windows Forms event model.

66.06	Create Windows Forms application that respond to common events, including mouse events, keyboard events, load events, click events, resize events, and drag events.
66.07	Define Windows Forms applications with graphical user interfaces (GUI) that conform to appropriate usability guidelines.
66.08	Create Windows Forms applications that use Multiple Document Interface (MDI) and Single Document Interface (SDI).
66.09	Describe visual inheritance.
66.10	Develop a Windows Forms application that inherits a form from a base application.
67.0	Develop Windows Service applications and class libraries. – The student will be able to:
67.01	Describe the characteristics and capabilities of a Windows Service application.
67.02	Describe the states in the lifetime of a service.
67.03	Describe the ServiceBase and ServiceController classes and their role in developing and controlling Windows Service applications.
67.04	Develop a Windows Service application.
67.05	Develop an installer for a Windows Service application.
67.06	Install and deploy a Windows Service application.
67.07	Test and debug a Windows Service application.
67.08	Uninstall a Windows Service application.
67.09	Develop, test, and debug a Class Library.
68.0	Demonstrate knowledge of database applications. – The student will be able to:
68.01	Explain common database terminology (e.g., relationships, normalization, fields, records, data integrity, referential integrity).
68.02	Describe the benefits and characteristics of relational databases.
68.03	Define primary keys and foreign keys and describe their purposes.
68.04	Explain how database design fits into the database application development process.
68.05	Translate an entity-relationship model into a relational database design.
68.06	Differentiate between one-to-one, one-to-many, and many-to-many relationships.
68.07	Move data from an unnormalized form through to a third normal form.
68.08	Based on information requirements, define database tables that ensure data integrity and reduce redundant data.

	68.09 Describe routine maintenance for databases.
69.0	Demonstrate knowledge of structured query language (SQL) statements. – The student will be able to:
	69.01 Describe the data manipulation language (DML) and describe various DML statements.
	69.02 List the capabilities of SQL SELECT statements.
	69.03 Write and execute a basic SELECT statement.
	69.04 Write and execute SELECT statements using the WHERE clause with common operators (i.e., =, <>, >, <, >=, <=, BETWEEN, LIKE, IN).
	69.05 Write and execute SELECT statements using the WHERE clause with logical operators, including AND and OR.
	69.06 Write and execute SELECT statements using the ORDER BY clause.
	69.07 Write and execute SELECT statements using wildcards.
	69.08 Write and execute UPDATE statements to modify rows in a table.
	69.09 Write and execute INSERT statements to insert rows into a table.
	69.10 Write and execute DELETE statements to delete rows in a table.
	69.11 Write and execute statements using JOIN to select data from two or more related tables.
	69.12 Write and execute statements that use SQL to perform common calculations (e.g., AVG, MAX, MIN, SUM).
70.0	Develop .NET database applications. – The student will be able to:
	70.01 Describe the purpose of ActiveX Data Objects (ADO).
	70.02 Describe the purpose of the ADO connection object.
	70.03 Write statements to connect to a database.
	70.04 Write statements to open a database.
	70.05 Write statements to create a recordset.
	70.06 Write statements to commit a transaction to a database.
	70.07 Write statements to rollback a transaction to a database.
	70.08 Write statements to close a connection to a database.
	70.09 Develop, test, and debug a database application.

	70.10 Develop, test, and debug a WPF application.
71.0	Successfully work as a member of a software development team. – The student will be able to:
	71.01 Accept responsibility for specific tasks in a given situation.
	71.02 Document progress, and provide feedback on work accomplished in a timely manner.
	71.03 Complete assigned tasks in a timely and professional manner.
	71.04 Reassign responsibilities when the need arises.
	71.05 Complete daily tasks as assigned on one's own initiative.
72.0	Manage time according to a plan. – The student will be able to:
	72.01 Set realistic time frames and schedules.
	72.02 Keep a written record of work accomplished on a daily basis.
	72.03 Meet goals and objectives set by the team.
	72.04 Identify individual priorities.
	72.05 Complete a weekly evaluation of accomplishments, and reevaluate goals, objectives and priorities, as needed.
73.0	Keep acceptable records of progress problems and solutions. – The student will be able to:
	73.01 Develop and use a record keeping system to record daily progress.
	73.02 Use a project journal to identify problem statement.
	73.03 Develop a portfolio of work accomplished to include requirements documents, design documents and UML, project and test plans, and prototypes.
74.0	Plan, organize, and carry out a project plan. – The student will be able to:
	74.01 Identify a substantive problem that can be addressed with a .NET software solution.
	74.02 Identify and document the potential customers for the project.
	74.03 Identify and document the customer requirements for the project including use case definitions.
	74.04 Document the proposed user interface for the project using common tools (e.g., mockups, event planning documents).
	74.05 Identify the hardware and software requirements for the project.
	74.06 Identify the programming tools required to develop the project.

	74.07 Write a detailed design document for the project.
	74.08 Write a detailed test plan for the project that addresses varying levels of testing including system testing and usability testing.
	74.09 Determine the scope of a project.
	74.10 Organize the team according to individual strengths.
	74.11 Assign specific tasks within a team.
	74.12 Determine project priorities.
	74.13 Identify required resources to complete the project.
	74.14 Plan, research, design, develop, and evaluate activities, as required.
	74.15 Carry out the project plan to successful completion.
	74.16 Document design problems, test results, product defects, and resolutions.
75.0	Manage resources. – The student will be able to:
	75.01 Identify required resources for each stage of the project plan.
	75.02 Determine the methods needed to acquire needed resources.
	75.03 Demonstrate good judgment in the use of resources.
	75.04 Recycle and reuse resources where appropriate.
	75.05 Demonstrate an understanding of proper legal and ethical treatment of copyrighted material.
76.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:
	76.01 Identify the proper tool for a given job.
	76.02 Use tools and machines in a safe manner.
	76.03 Adhere to laboratory or job site safety rules and procedures.
	76.04 Identify the application of processes appropriate to the task at hand.
	76.05 Identify materials appropriate to their application.
77.0	Demonstrate an understanding of the software development process. – The student will be able to:
	77.01 State the goals of the software application clearly.

	77.02 Identify and write a plan to achieve each goal.
	77.03 Develop a list of materials and content required for each goal.
	77.04 Develop a step-by-step procedure for developing the application.
	77.05 Follow a written procedure.
	77.06 Record data from evaluation activities.
	77.07 Document conclusions and solutions based on evaluation results, observations and data.
	77.08 Document progress using a project log.
	77.09 Write an abstract describing the project plan.
78.0	Research content related to the project and document the results following industry conventions. – The student will be able to:
	78.01 Identify the basic research needed to develop the project plan.
	78.02 Identify available resources for completing background research required in the project plan.
	78.03 Demonstrate the ability to locate resource materials in a library, database, Internet and other research resources.
	78.04 Demonstrate the ability to organize information retrieval.
	78.05 Demonstrate the ability to prepare a topic outline.
	78.06 Write a draft of the research report.
	78.07 Edit and proof the research report. Use proper form for a bibliography, footnotes, quotations, and references.
	78.08 Prepare an electronically composed research paper in proper form.
	78.09 Conduct an alpha and beta evaluation of the project's product.
	78.10 Write a report on the evaluations, documenting results, data, observations, and design changes based on the results.
79.0	Use presentation skills, and appropriate media to describe the progress, results and outcomes of the experience. – The student will be able to:
	79.01 Prepare a multi-media presentation on the completed project.
	79.02 Make an oral presentation about the project using the multi-media materials.
	79.03 Review the presentation, and make changes in the delivery method(s) to improve presentation skills.
80.0	Demonstrate competency in the area of expertise related to developing computer software using the .NET framework. – The student will be able to:

80.01	Demonstrate a mastery of the content of the selected subject area.
80.02	Demonstrate the ability to use related technological tools, materials and processes related to the specific program area.
80.03	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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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 comprising the Software Development Core. Secondary or postsecondary students who have previously completed the Software Development Core will not have to repeat the core. 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.

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

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 Demonstrate comprehension and communication skills
03.0 Use technology to enhance the effectiveness of communication skills.
04.0 Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
05.0 Use database and spreadsheet applications.
06.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
07.0 Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles.
08.0 Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance.
09.0 Incorporate knowledge gained from individual assessment and job/career exploration to design an individual career plan that reflects the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Demonstrate personal and interpersonal skills appropriate for the workplace.
11.0 Perform e-mail activities.
12.0 Demonstrate proficiency using slide presentation software.
13.0 Demonstrate proficiency using HTML commands.
14.0 Demonstrate proficiency in page design applicable to the WWW.
15.0 Investigate emerging technologies.
16.0 Demonstrate proficiency using common software applications.
17.0 Demonstrate knowledge of different operating systems.
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 Design a computer program to meet specific physical, operational, and interaction criteria.
27.0 Create and document a computer program that uses a variety of internal and control structures for manipulating varied data types.
28.0 Create and document an interactive computer program that employs functions, subroutines, or methods to receive, validate, and process user input.
29.0 Create a unit test plan, implement the plan, and report the results of testing.
30.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
31.0 Solve problems using critical thinking skills, creativity and innovation.
32.0 Use information technology tools.

33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
34.0 Describe the importance of professional ethics and legal responsibilities.
35.0 Explain key concepts that distinguish object-oriented programming from procedural programming.
36.0 Create a project plan that defines requirements, structural design, time estimates, and testing elements.
37.0 Design, document, and create object-oriented computer programs.
38.0 Design a unit test plan for an object-oriented computer program, test and debug the program, and report the results.
39.0 Demonstrate proficiency using HTML and XHTML to create web content.
40.0 Demonstrate proficiency using cascading style sheets (CSS) to format web pages.
41.0 Demonstrate proficiency using basic client-side scripting to control the content and the behavior of HTML and XHTML documents.
42.0 Demonstrate an understanding of JavaScript programming fundamentals.
43.0 Demonstrate proficiency in assigning and handling variables in JavaScript programs and functions.
44.0 Use event handlers in JavaScript programs and functions.
45.0 Recognize and assign data types appropriate to their use.
46.0 Demonstrate proficiency in using appropriate operators to achieve a planned output.
47.0 Write executable statements.
48.0 Demonstrate an understanding of variable scope.
49.0 Use good programming practices.
50.0 Demonstrate use of the Document Object Module (DOM).
51.0 Use conditional control statements in JavaScript.
52.0 Use iterative control statements in JavaScript.
53.0 Use nested loop iterative control statements in JavaScript.
54.0 Use JavaScript to produce input and output for programs.
55.0 Demonstrate proficiency in using Form Objects in JavaScript programs and functions.
56.0 Demonstrate proficiency in using methods in JavaScript programs and functions.
57.0 Demonstrate proficiency in using parameters in JavaScript programs and functions.
58.0 Utilize debugging techniques in programs.
59.0 Recognize security risks in programs.
60.0 Use plug-ins and libraries.
61.0 Demonstrate proficiency in programming for mobile delivery technology (e.g., iPhone/Android).
62.0 Demonstrate an understanding of Personal Home Page (PHP) programming language.
63.0 Demonstrate proficiency in PHP configuration.
64.0 Demonstrate an understanding of PHP language basics.
65.0 Demonstrate proficiency in the use of server processes.
66.0 Demonstrate an understanding of object-oriented programming in PHP.
67.0 Demonstrate proficiency in writing PHP code to handle file input/output (I/O) operations.
68.0 Demonstrate proficiency in creating, populating, and using arrays in PHP.
69.0 Demonstrate proficiency handling strings in PHP.
70.0 Demonstrate proficiency in using PHP to access databases via Open Database Connectivity (ODBC).
71.0 Demonstrate proficiency in applying best practices for ensuring creation of a secure program.
72.0 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**	
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 computer technology and software to perform personal and business related tasks in the workplace by establishing digital calendars, meetings, appointments, and create and manipulate e-mail contacts.
01.03	Identify and describe types of file systems and classify common file extensions based on software application programs used in the workplace environment.
01.04	Use reference materials such as on-line help, tutorials, and manuals available for application software.
01.05	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
01.06	Discuss the process of troubleshooting problems with computer hardware peripherals, including input and output devices in the workplace environment.
01.07	Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
01.08	Apply ergonomic principles and view devices applicable to computer workstation and the workplace environment.
02.0	Demonstrate comprehension and communication skills. – The student will be able to:
02.01	Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
02.02	Write clear and well-organized research papers using MLA or APA documentation formats, integrating software applications for documentation setup. Demonstrate knowledge of ethical behavior regarding plagiarism and copyright violations.
02.03	Prepare and deliver a report using appropriate presentation software.
02.04	Select a team leader to facilitate large group discussions with team members.
02.05	Take notes, organize, summarize, and paraphrase main ideas and details using various note taking systems and reading strategies.
02.06	Apply the writing process to the creation of appropriate documents following designated business formats.

	02.07	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.
	02.08	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	Select and use word processing software and accompanying features to enhance written business communications.
	03.02	Share and maintain documents by applying different views and protection to a document and manage document versions. Share and save a document and apply a template.
	03.03	Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs. Apply spacing settings to text and paragraphs. Navigate and search through a document, create and manipulate tables.
	03.04	Apply page layout and reusable content by editing and manipulating page setup settings and applying themes. Construct content by using the building blocks tools. Create and manipulate page backgrounds, headers and footers.
	03.05	Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document. Insert and format pictures, shapes, and clipart. Apply and manipulate text boxes.
	03.06	Proofread documents by validating content through the use of spell and grammar check. Configure autocorrect settings, insert and modify comments in a document.
	03.07	Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	03.08	Perform various mail merge options.
04.0	Demonstrate proficiency using computer networks, internet and online databases to facilitate collaborative or individual learning and communication. – The student will be able to:	
	04.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol. Identify and describe web terminology, addresses and how browsers work.
	04.02	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books. Describe appropriate browser security configurations.
	04.03	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
	04.04	Demonstrate proficiency using search engines and search tools.
	04.05	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression. Identify Boolean search strategies.
	04.06	Use computer networks, including on-line databases and resources to facilitate collaborative or individual learning and communication.
	04.07	Describe how business transactions and academic applications are supported by interactive web applications, including sharing photos and video clips, messaging, chatting and collaborating.
	04.08	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.

05.0	Use database and spreadsheet applications. – The student will be able to:
05.01	Manage the worksheet environment by navigating through and printing a worksheet. Personalize the environment by manipulating the ribbon tabs, group settings, importing data, manipulating properties, files and folders.
05.02	Create cell data, apply auto fill and hyperlinks.
05.03	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns. Manipulate page set up options. Create and apply cell styles.
05.04	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views.
05.05	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references. Apply conditional formula logic, name and cell ranges.
05.06	Demonstrate data visually by creating and modifying charts and images.
05.07	Share worksheet data through email, changing file type and different versions. Manage comments.
05.08	Analyze and organize data through filters, sorting and applying conditional formatting.
06.0	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:
06.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
07.0	Investigate management functions and organizational structures as they relate to today's workplace and employer/employee roles. – The student will be able to:
07.01	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
07.02	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.
08.0	Apply mathematical operations and processes as well as financial planning strategies to commonly occurring situations in the workplace to accomplish job objectives and enhance workplace performance. – The student will be able to:
08.01	Analyze, interpret, compile, and demonstrate the ability to present and communicate data in understandable and measurable terms using common statistical procedures using charts and graphs.
08.02	Use common standards of measurement including the metric system in solving work-related or business problems (e.g., length, weight, currency, time).
08.03	Select and use the correct mathematical processes and tools to solve complex problem situations that are typical of business settings and use formulas and spreadsheets when appropriate.
09.0	Incorporate knowledge gained from individual assessment and job/career exploration to 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:
09.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.
09.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.

	09.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.
	09.04	Design and initiate a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
	09.05	Refine and implement a plan to facilitate personal growth and skill development related to anticipated job requirements and career expectations.
	09.06	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
	09.07	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
	09.08	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
10.0	Demonstrate personal and interpersonal skills appropriate for the workplace. – The student will be able to:	
	10.01	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
	10.02	Apply appropriate strategies to manage and resolve conflicts in work situations.
	10.03	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.
11.0	Perform e-mail activities. – The student will be able to:	
	11.01	Describe and perform e-mail capabilities and functions. Create and send messages, manage signature and automated messages. Save, send, schedule, and manage junk mail, e-mail and spam. Configure message sensitivity, security and delivery options.
	11.02	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
	11.03	Manage tasks and organize information.
12.0	Demonstrate proficiency using slide presentation software. – The student will be able to:	
	12.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
	12.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
	12.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
	12.04	Explore and apply design and color theory to create dynamic and appealing visuals.
	12.05	Explore various design tools and applications.
	12.06	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
	12.07	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.

12.08	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.
12.09	Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
13.0	Demonstrate proficiency using HTML commands. – The student will be able to:
13.01	Identify elements of a Web page.
13.02	Describe individual Web page layouts and content (e.g., writing for the Web, Web structure).
13.03	Define basic HTML terminology.
13.04	Analyze HTML source code developed by others.
13.05	Create Web pages using basic HTML tags (e.g., links, lists, character styles, text alignment, tables).
13.06	Use storyboarding techniques for subsequent Web pages (e.g., linear, hierarchical).
13.07	Edit and test HTML documents for accuracy and validity.
13.08	Use basic functions of WYSIWYG editors.
13.09	Use basic functions of HTML, DHTML, and XML editors and converters.
13.10	Enhance web pages through the addition of images and graphics including animation.
14.0	Demonstrate proficiency in page design applicable to the WWW. – The student will be able to:
14.01	Develop an awareness of acceptable Web page design, including index pages in relation to the rest of the Web site.
14.02	Describe and apply color theory as it applies to Web page design (e.g., background and text color).
14.03	Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
14.04	Use image design software to create and edit images.
14.05	Demonstrate proficiency in publishing to the Internet.
14.06	Demonstrate proficiency in adding downloadable forms to web pages.
14.07	Explain the need for web-based applications.
15.0	Develop an awareness of emerging technologies. – The student will be able to:
15.01	Compare and contrast various methods of evaluation for emerging technologies.

	15.02 Demonstrate knowledge of the process of planning upgrades and changeovers.
	15.03 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).
16.0	Demonstrate proficiency using common software applications. – The student will be able to:
	16.01 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).
	16.02 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).
17.0	Demonstrate knowledge of different operating systems. – The student will be able to:
	17.01 Identify operating system file naming conventions.
	17.02 Demonstrate proficiency with file management and structure (e.g., folder creation, file creation, backup, copy, delete, open, save).
	17.03 Demonstrate a working knowledge of standard file formats.
	17.04 Explain the history and purpose of various operating systems (e.g., DOS, Windows, Mac, and Unix/Linux).

Course Number: CTS0041 **Occupational Completion Point: B** **Computer Programmer Assistant – 300 Hours – SOC Code 15-1131**	
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.
18.02	Identify tasks performed by programmers.
18.03	Describe how businesses use computer programming to solve business problems.
18.04	Investigate job opportunities in the programming field.
18.05	Explain different specializations and the related training in the computer programming field.
18.06	Explain the need for continuing education and training of computer programmers.
18.07	Explain enterprise software systems and how they impact business.
18.08	Describe ethical responsibilities of computer programmers.
18.09	Describe the role of customer support to software program quality.
18.10	Identify credentials and certifications that may improve employability for a computer programmer.
18.11	Identify devices, tools, and other environments for which programmers may develop software.
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.
19.02	Explain the types and uses of variables in programs.
19.03	Determine the best data type to use for given programming problems.
19.04	Identify the types of operations that can be performed on different data types.
19.05	Evaluate arithmetic and logical expressions using appropriate operator precedence.
19.06	Explain how computers store different data types in memory.
19.07	Use different number systems to represent data.
19.08	Explain how national and international standards (i.e., ASCII, UNICODE) are used to represent non-numerical data.

	19.09 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.
	20.02 Explain iterative programming structures (e.g., while, do/while) and their uses.
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.
	21.02 Identify the characteristics, uses, and limits of high-level programming languages.
	21.03 Identify the characteristics, uses, and limits of rapid development programming languages.
	21.04 Describe object-oriented concepts.
	21.05 Explain the characteristics of procedural and object-oriented programming languages.
	21.06 Compare and contrast programming languages that are compiled (e.g., C++), interpreted (e.g., Basic, HTML), and translated (e.g., Java).
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.
	22.02 Describe the stages of the program life cycle.
	22.03 Compare and contrast alternatives methods of program development (e.g., rapid prototyping, waterfall).
	22.04 List and explain the steps in the program development cycle.
	22.05 Describe different types of documentation used in the program development cycle (e.g., requirements document, program design documents, test plans).
	22.06 Describe the on-going need for program maintenance.
	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).
	22.08 Describe different methods used to facilitate version control and change management.
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.
	23.02 Explain testing performed at different stages of the program development cycle (e.g. unit testing, system testing, user acceptance testing).

	23.03	Describe data and the use of test plans/scripts to be used in program testing.
	23.04	Describe and identify types of programming errors (e.g., syntactical, logic, usability, requirements mismatch).
	23.05	Identify the data to be used for boundary conditions.
	23.06	Explain different types of testing (e.g., usability, automated, regression) and testing tools.
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).
	24.02	Describe tools for developing a program design (e.g., UML, flowcharts, design documents, pseudocode).
	24.03	Explain the role of existing libraries and packages in facilitating programmer productivity.
	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).
	24.05	Write a program design document using UML or other standard design methodology.
	24.06	Define input and output for a program module using UML or other standard design methodology.
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.
	25.02	Identify different types of threats to computer systems.
	25.03	Identify methods to protect against different threats to computer systems.
	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).
26.0	Design a computer program to meet specific physical, operational, and interaction criteria. – The student will be able to:	
	26.01	Choose appropriate data types depending on the needs of the program.
	26.02	Define appropriate user interface prompts for clarity and usability (e.g., user guidance for data ranges, data types).
	26.03	Design and develop program that are designed for efficiency (e.g., less memory usage, less inputs/outputs, faster processing).
	26.04	Identify the software environment required for a program to run (e.g., operating system required, mobile, Web-based, desktop, delivery method).
	26.05	Identify the tools required to develop a program (e.g., editors, compilers, linkers, integrated development environments, application programming interfaces (APIs), libraries).

27.0	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:
	27.01 Use appropriate naming conventions to define program variables and modules (methods, functions).
	27.02 Use a program editor to write the source code for a program.
	27.03 Write programs that use selection structures (e.g., if, if/else).
	27.04 Write programs that use repetition structures (e.g., while, do/while).
	27.05 Write programs that use nested structures.
	27.06 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.
	27.07 Compile and run programs.
	27.08 Write programs that use standard arithmetic operators with different numerical data types.
	27.09 Write programs that use standard logic operators.
	27.10 Write programs that use a variety of common data types.
	27.11 Write programs that perform data conversion between standard data types.
	27.12 Write programs that define, use, search, and sort arrays.
	27.13 Write programs that use user-defined data types.
	27.14 Demonstrate understanding and use of appropriate variable scope.
28.0	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:
	28.01 Write programs that perform user input and output.
	28.02 Write programs that validate user input (e.g., range checking, data formats, valid/invalid characters).
	28.03 Write program modules such as functions, subroutines, or methods.
	28.04 Write program modules that accept arguments.
	28.05 Write program modules that return values.
	28.06 Write program modules that validate arguments and return error codes.
	28.07 Write interactive programs.

	28.08 Write programs that use standard libraries to enhance program function.
	28.09 Participate in a peer code review to verify program functionality, programming styles, program usability, and adherence to common programming standards.
29.0	Create a unit test plan, implement the plan, and report the results of testing. – The student will be able to:
	29.01 Write a unit test plan that identifies the input data and expected results for program tests.
	29.02 Test and debug programs, including programs written by others.
	29.03 Write a test report that identifies the results of testing.
	29.04 Trace through the function of a program to ensure valid operation.
	29.05 Identify the system resources used by the program (e.g., memory, disk space, execution time, external devices).
	29.06 Create a disaster / emergency response plan for a computer system.
30.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. – The student will be able to:
	30.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	30.02 Locate, organize and reference written information from various sources.
	30.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	30.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	30.05 Apply active listening skills to obtain and clarify information.
	30.06 Develop and interpret tables and charts to support written and oral communications.
	30.07 Exhibit public relations skills that aid in achieving customer satisfaction.
31.0	Solve problems using critical thinking skills, creativity and innovation. – The student will be able to:
	31.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	31.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	31.03 Identify and document workplace performance goals and monitor progress toward those goals.
	31.04 Conduct technical research to gather information necessary for decision-making.

32.0	Use information technology tools. – The student will be able to:
32.01	Use personal information management (PIM) applications to increase workplace efficiency.
32.02	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
32.03	Employ computer operations applications to access, create, manage, integrate, and store information.
32.04	Employ collaborative/groupware applications to facilitate group work.
33.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. – The student will be able to:
33.01	Employ leadership skills to accomplish organizational goals and objectives.
33.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
33.03	Conduct and participate in meetings to accomplish work tasks.
34.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
34.01	Evaluate and justify decisions based on ethical reasoning.
34.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
34.03	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**	
35.0	Explain key concepts that distinguish object-oriented programming from procedural programming. – The student will be able to:
35.01	Demonstrate the understanding and use of classes, objects, attributes, and behaviors.
35.02	Demonstrate the understanding and use of inheritance.
35.03	Demonstrate the understanding and use of data encapsulation.
35.04	Demonstrate the understanding and use of polymorphism.
36.0	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:
36.01	Write a project plan for completion of a project that includes gathering program requirements, developing the program, and testing it.
36.02	Write a program requirements document that identifies business purpose, functional requirements, system requirements, and other common components of a requirements document.
36.03	Design an object-oriented program using UML or another standard design methodology.
36.04	Work with other team members to develop a project plan for a program.
36.05	Work with other team members to write a design document for a program with multiple functions and shared data.
36.06	Participate in design meetings that review program design documents for conformance to program requirements.
36.07	Estimate the time to develop a program or module.
37.0	Design, document, and create object-oriented computer programs. – The student will be able to:
37.01	Compare and contrast recursive functions to other iterative methods.
37.02	Understand the implementation of character strings in the programming language.
37.03	Write programs that perform string processing (e.g., string manipulation, string compares, concatenation).
37.04	Write programs that use user-defined data types.
37.05	Write object-oriented programs that use inheritance.
37.06	Write object-oriented programs that use polymorphism.
37.07	Develop class constructors.

	37.08	Write programs that define and use program constants.
	37.09	Write programs that perform error handling.
	37.10	Participate in program code review meetings to evaluate program code for validity, quality, performance, data integrity, and conformance to program design documents.
	37.11	Write programs that perform dynamic memory allocation.
	37.12	Write programs that perform effective management of dynamically allocated memory.
	37.13	Update a program module to implement enhancements or corrections and demonstrate appropriate documentation (internal and external) related to version control.
	37.14	Write programs that use complex data structures (e.g., stacks, queues, trees, linked lists).
	37.15	Write programs that are event-driven.
	37.16	Write programs that perform file input and output (i.e., sequential and random access file input/output).
	37.17	Perform basic database commands including connect, open, select, and close.
38.0	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:	
	38.01	Develop a test plan for an object-oriented program.
	38.02	Write test plans for event-driven programs.
	38.03	Write test plans for programs that perform file input and output.
	38.04	Perform test and debug activities on object-oriented programs, including those written by someone else.
	38.05	Perform test and debug activities on an event-driven program.
	38.06	Perform test and debug activities on programs that perform file input and output and verify the correctness of output files.
	38.07	Document the findings of testing in a test report.

Course Number: CTS0034 **Occupational Completion Point – D** **Web Programmer – 450 Hours – SOC Code 15-1131**	
39.0	Demonstrate proficiency using HTML and XHTML to create web content. — The student will be able to:
39.01	Use storyboarding techniques for designing a Web site (e.g., linear, hierarchical).
39.02	Identify elements of a Web page.
39.03	Create Web pages using HTML and XHTML tags that create basic elements (e.g., links, lists, formatted text, tables).
39.04	Create Web pages that utilize tables to achieve complex layout.
39.05	Add graphic content to Web pages.
39.06	Create Web pages that utilize client-side image maps.
39.07	Develop, integrate, and apply the use of forms in Web site design.
39.08	Optimize Web content for desirable search engine placement.
39.09	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).
39.10	Demonstrate an understanding of Web accessibility issues by developing pages that meet Bobby accessibility checker criteria.
39.11	Explain basic XML syntax and how XHTML conforms to the XML standard.
39.12	Use a WYSIWYG editor to develop and manage a Web site.
39.13	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.
39.14	Analyze and modify HTML and XHTML source code developed by others.
40.0	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.
40.01	Describe the difference between linked, embedded, imported and inline styles and explain how styles are inherited.
40.02	Explain the difference between classes, id, and span elements.
40.03	Utilize CSS properties within Web pages to control page layout, fonts, colors, backgrounds, and other presentation effects.
40.04	Demonstrate understanding of the Box Model.
40.05	Demonstrate proficiency in creating 1 to 3 column layouts.

	40.06 Create navigation system through CSS.
41.0	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:
	41.01 Describe the difference between server-side and client-side processing.
	41.02 Describe the term “scripting language” and explain how scripting languages differ from compiled languages.
	41.03 Create web pages that employ client-side scripting to control content and display.
42.0	Demonstrate an understanding of JavaScript programming fundamentals. – The student will be able to:
	42.01 Describe server side versus client side applications including interpreters.
	42.02 Describe the purpose and use of an interpreter in relation to JavaScript.
	42.03 Describe differences in different types of JavaScript implementations (i.e., Jscript, ECMA).
	42.04 Declare and initialize variables.
	42.05 Assign new values to variables.
	42.06 Create and use constant variables.
	42.07 Describe the difference of programming languages versus scripting languages.
	42.08 Describe object based nature and platform independence.
	42.09 Describe and demonstrate inline scripting.
43.0	Demonstrate proficiency in assigning and handling variables in JavaScript programs and functions. – The student will be able to:
	43.01 Describe how variables are used in programs.
	43.02 Identify which data type should be used for a given value.
	43.03 Identify the syntax for using variables.
	43.04 Declare and initialize variables.
	43.05 Assign new values to variables.
	43.06 Create and use constant variables.
	43.07 Describe and demonstrate the use of properties.

	43.08 Describe identifiers and identify valid and invalid identifiers.
	43.09 Describe and identify reserved words, delimiters, literals, and comments.
44.0	Use event handlers in JavaScript programs and functions. – The student will be able to:
	44.01 Describe the event model and five events (form, image, map, link, and window).
	44.02 Demonstrate and use the window events load, focus, blur, and unload.
	44.03 Demonstrate and use the form events change, reset, and submit.
	44.04 Demonstrate and use the text events cut, paste, select, and copy.
	44.05 Demonstrate and use the mouse events mousemove, mousedown, click, mousewheel, mouseover, mouseout and mouseover.
	44.06 Demonstrate and use the keyboard events keyup, keydown, keypress.
	44.07 Demonstrate using the appropriate event handlers with their associated events.
45.0	Recognize and assign data types appropriate to their use. – The student will be able to:
	45.01 Describe the data type categories.
	45.02 Give examples of var, primitives, null, and undefined data types.
	45.03 Demonstrate the use of var in relation to other datatypes.
46.0	Demonstrate proficiency in using appropriate operators to achieve a planned output. – The student will be able to:
	46.01 Construct statements using arithmetic operators.
	46.02 Construct statements using relational operators.
	46.03 Construct and use statements using logical operators.
	46.04 Construct and use statements using string concatenation, and strict comparison.
	46.05 Construct and use statements using assignment operators.
	46.06 Construct and execute statements using operator precedence.
47.0	Write executable statements. – The student will be able to:
	47.01 Construct variable assignment statements.

	47.02 Construct statements using built-in functions.
	47.03 Describe when implicit data type conversions take place.
	47.04 List the drawbacks of implicit data type conversions.
	47.05 Construct statements using functions to explicitly convert data types.
48.0	Demonstrate an understanding of variable scope. – The student will be able to:
	48.01 Understand the scope and visibility of variables.
	48.02 Write programs using local variables.
	48.03 Describe the scope of a variable.
49.0	Use good programming practices. – The student will be able to:
	49.01 List examples of good programming practices.
	49.02 Insert comments into code.
	49.03 Demonstrate the use of <no script> tag.
	49.04 Follow formatting guidelines when writing code.
	49.05 Understand the different types of errors produced by programs.
50.0	Demonstrate use of the Document Object Module (DOM). – The student will be able to:
	50.01 Create and use user defined objects.
	50.02 Create user defined objects with properties and methods.
	50.03 Describe and Use the Array Object including its parameters, properties, and methods (chop, join, pop, push, splice, split).
	50.04 Describe and Use the Date Object including its multiple constructors, properties, and methods (getDay, getMonth, getYear, getMinutes, getHous, getTime).
	50.05 Describe and use the Window Object including \properties, and methods.
	50.06 Describe and use the Image Object including its properties, and methods.
	50.07 Describe and use the History Object including its properties, and methods.
	50.08 Describe and use the RegEx Object for basic and complex regular expressions.

	50.09 Describe and use the String Object including its properties, and methods.
	50.10 Describe and use the Math Object including its properties, and methods.
51.0	Use conditional control statements in JavaScript. – The student will be able to:
	51.01 Construct and use an if statement.
	51.02 Construct and use a switch statement.
	51.03 Construct and use a while, do while, and for loop.
	51.04 Construct and use a conditional operator.
52.0	Use iterative control statements in JavaScript. – The student will be able to:
	52.01 Describe the types of loop statements and their uses.
	52.02 Construct and use the while and do while loop.
	52.03 Construct and use the for loop.
	52.04 Describe when a while loop is used.
	52.05 Describe when a for loop is used.
53.0	Use nested loop iterative control statements in JavaScript. – The student will be able to:
	53.01 Construct and execute a program using nested loops.
	53.02 Construct and execute a loop using break and continue.
	53.03 Evaluate a nested loop construct and sentinel value.
54.0	Use JavaScript to produce input and output for programs. – The student will be able to:
	54.01 Describe and use the prompt() and confirm() to input data into programs.
	54.02 Describe and demonstrate the use of the alert() to produce output to the console.
	54.03 Describe and demonstrate how to input data using JavaScript Events.
	54.04 Describe and demonstrate how to output using the document.write().
	54.05 Explain the difference of prompt() and confirm() functions.

	54.06 Create and use escape sequences.
55.0	Demonstrate proficiency in using Form Objects in JavaScript programs and functions. – The student will be able to:
	55.01 Use Form objects to validate input.
	55.02 Access the value of the form object through its associated method.
	55.03 Describe and use button, checkbox, textarea, select, radio, hidden, and text objects.
	55.04 Access and modify values and attributes at runtime using getElementbyId, getElementsbyName, getElementsbyTagName, and inner HTML.
56.0	Demonstrate proficiency in using methods in JavaScript programs and functions. – The student will be able to:
	56.01 Differentiate between anonymous methods and methods.
	56.02 Identify the benefits of using methods.
	56.03 Describe and use inner method.
	56.04 Create a method.
	56.05 Describe how a method is invoked.
57.0	Demonstrate proficiency in using parameters in JavaScript programs and functions. – The student will be able to:
	57.01 Describe how parameters are passed into functions.
	57.02 Define a parameter.
	57.03 Create a method using a parameter.
	57.04 Invoke a method that has parameters.
	57.05 Distinguish between formal and actual parameters.
58.0	Utilize debugging techniques in programs. – The student will be able to:
	58.01 Use the display property to enable/disable code blocks.
	58.02 Use document.write() to log program execution.
	58.03 Test program in different browsers and mobile devices for compatibility errors.
	58.04 Use comments as a flow control while debugging.

59.0	Recognize security risks in programs. – The student will be able to:
59.01	Describe the security risk of cookies and browsers.
59.02	Identify security responsibilities of browsers and operating system.
59.03	Describe security systems such as frame to frame URL changing.
59.04	Describe the use of signed scripts.
59.05	Create and use cookies in a secure manner.
60.0	Use plug-ins and libraries. – The student will be able to:
60.01	Use external libraries in the program.
60.02	Describe and contrast the following industry libraries JQuerry, Dojo, LightBox, and Moo Tools, PhoneGap.
60.03	Describe different types of libraries full, effects, tools, graphing, math, cryptography, and AJAX.
60.04	Identify how load and reference external and user made scripts.
60.05	Describe AJAX elements and procedures.
60.06	Describe XML.
60.07	Demonstrate the use of XMLHttpRequest to retrieve data.
61.0	Demonstrate proficiency in programming for mobile delivery technology (e.g., iPhone/Android). – The student will be able to:
61.01	Respond to multi-touch and gesture events.
61.02	Describe and demonstrate the use of webkit CSS.
61.03	Use the meta tag to enable native look and feel.
61.04	Create a splash screen.
61.05	Describe and demonstrate app caching.
61.06	Describe and demonstrate use of JQuery for mobile development.
61.07	Describe how to publish the app using XCode.

62.0	Demonstrate an understanding of Personal Home Page (PHP) programming language. – The student will be able to:
	62.01 Describe the evolution of PHP as a programming language.
	62.02 Discuss the strengths and limitations of PHP.
63.0	Demonstrate proficiency in PHP configuration. – The student will be able to:
	63.01 Set up a PHP host (wamp, mamp, online).
	63.02 Configure PHP for File Transfer Protocol (FTP) access.
	63.03 Configure the config.php file.
64.0	Demonstrate an understanding of PHP language basics. – The student will be able to:
	64.01 Describe how variables are declared, referenced, and passed.
	64.02 Describe the control structures inherent with PHP programming.
	64.03 Describe the three types of arrays used in PHP.
	64.04 Describe how functions in PHP are created, called, and controlled.
65.0	Demonstrate proficiency in the use of server processes. – The student will be able to:
	65.01 Describe a session and explain its importance and use in web programming.
	65.02 Describe the server processes associated with forms handling.
	65.03 Compare and contrast the use of GET and POST.
	65.04 Describe cookies and explain their use, population, control, and risks.
	65.05 Describe HTTP Headers and their role in web development.
	65.06 Describe HTTP Authentication.
66.0	Demonstrate an understanding of object-oriented programming in PHP. – The student will be able to:
	66.01 Create classes using PHP.
	66.02 Describe inheritance and its role in PHP programming.
	66.03 Write PHP code to handle exceptions.

	66.04 Write PHP code to accommodate different interfaces.
67.0	Demonstrate proficiency in writing PHP code to handle file input/output (I/O) operations. – The student will be able to:
	67.01 Write PHP code to perform open, read, and write operations on files.
	67.02 Write PHP code to initiate file system functions.
	67.03 Write PHP code to handle streams.
68.0	Demonstrate proficiency in creating, populating, and using arrays in PHP. – The student will be able to:
	68.01 Create, populate and write code to extract information from a numeric array in PHP.
	68.02 Create, populate and write code to extract information from an associative array in PHP.
	68.03 Create, populate and write code to extract information from a multidimensional array in PHP.
69.0	Demonstrate proficiency handling strings in PHP. – The student will be able to:
	69.01 Write PHP code to retrieve or extract one or more characters from a string.
	69.02 Write PHP code to convert a string from data type to another.
	69.03 Write PHP code to manipulate the display characteristics of string data.
	69.04 Write PHP code that uses string date to control program flow.
	69.05 Write PHP code to join array elements with a string.
70.0	Demonstrate proficiency in using PHP to access databases via Open Database Connectivity (ODBC). – The student will be able to:
	70.01 Write PHP code to create an ODBC connection and retrieve information from a database using the appropriate Structured Query Language (SQL) statement.
	70.02 Describe a prepared statement and discuss its primary advantages (e.g., code efficiency, SQL Injection prevention).
	70.03 Create a prepared statement to perform specific SQL actions.
	70.04 Describe a PHP Data Object (PDO) transaction and explain its primary advantages.
	70.05 Create a prepared statement and associated result set using PDOStatement.
71.0	Demonstrate proficiency in applying best practices for ensuring creation of a secure program. – The student will be able to:
	71.01 Describe an SQL Injection, its consequences, and ways in which it may be prevented via programming.

	71.02 Describe the Remote Code Injection vulnerability in PHP and ways in which it may be prevented.
	71.03 Describe the risk of session hijacking in PHP and ways to program around it.
	71.04 Describe the risks associated with uploading files in PHP and ways in which risks might be mitigated.
	71.05 Describe Secure Sockets Layer (SSL) and usage issues related to PHP.
72.0	Demonstrate an understanding of key technologies, protocols, and architectures associated with web development and programming. – The student will be able to:
	72.01 SimpleXML functions.
	72.02 Extensible Markup Language (XML) Extension.
	72.03 XML Path Language (Xpath).
	72.04 Web Services.
	72.05 Simple Object Access Protocol (SOAP).
	72.06 Representational State Transfer (REST).
	72.07 JavaScript Object Notation (JSON).
	72.08 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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