Florida Department of Education
Curriculum Framework

Program Title: **Applied Information Technology**
Program Type: **Career Preparatory**
Career Cluster: **Information Technology**

Career Certificate Program		
Program Number	Y300400	
CIP Number	0511010302	
Grade Level	30, 31	
Program Length	600 hours	
Teacher Certification	Refer to the **Program Structure** section.	
CTSO	PBL, BPA	
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.	
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml	
Basic Skills Level	Computation (Mathematics): 9	Communication (Reading and Language Arts): 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, webpage 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.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	OTA0040	Information Technology Assistant	OTA0040 Teacher Certifications	150 hours
B	CTS0072	IT & Web Systems	BUS ED 1 @2 COMPU SCI 6 INFO TECH 7G	300 hours
C	CTS0063	Database Essentials		150 hours
D	CTS0030	Programming Fundamentals		150 hours
E	CTS0073	Web Development Fundamentals		150 hours
F	CTS0075	Multimedia Systems		150 hours
G	CTS0025	Computer Networking		150 hours
H	CTS0068	Cybersecurity Essentials		150 hours

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

Information Technology Assistant (OTA0040) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 15.0 are associated with this course.

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

01.0 Demonstrate knowledge, skill, and application of information technology to accomplish job objectives and enhance workplace performance.
02.0 Develop an awareness of microcomputers.
03.0 Demonstrate an understanding of networks.
04.0 Use word processing applications to enhance the effectiveness of various types of documents and communication.
05.0 Use presentation applications to enhance communication skills.
06.0 Use spreadsheet applications to enhance communication skills.
07.0 Use database applications to store and organize data.
08.0 Use electronic mail to enhance communication skills.
09.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
10.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
11.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
12.0 Develop awareness of computer languages, web-based and software applications, and emerging technologies.
13.0 Demonstrate an understanding of basic html by creating a simple web page.
14.0 Demonstrate comprehension and communication skills.
15.0 Use social media to enhance online communication and develop an awareness of a digital footprint.
16.0 Demonstrate proficiency on the principles of design.
17.0 Demonstrate proficiency planning an effective website.
18.0 Demonstrate proficiency using web development tools and techniques.
19.0 Demonstrate proficiency using specialized web design software.
20.0 Demonstrate proficiency gathering and preparing web content.
21.0 Demonstrate an awareness of preparing a website for launch.
22.0 Explain motherboard components, types and features.
23.0 Explain the purpose and characteristics of CPUs and their features.
24.0 Perform installation and configuration activities.
25.0 Perform the process for problem diagnostics and problem resolution through wireless, infrared, telephone, e-mail, remote access, or direct contact.
26.0 Demonstrate knowledge of presentation production issues.
27.0 Demonstrate proficiency using computer networks.
28.0 Demonstrate proficiency communicating over the Internet.
29.0 Demonstrate proficiency in troubleshooting, repair and maintenance of hardware.

30.0 Demonstrate proficiency in the basic principles of security concepts and technologies.
31.0 Demonstrate proficiency in operational procedures as they relate to computer equipment and components.
32.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
33.0 Solve problems using critical thinking skills, creativity and innovation.
34.0 Use information technology tools.
35.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
36.0 Describe the importance of professional ethics and legal responsibilities.
37.0 Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs.
38.0 Develop the process of creating an entity by identifying relationships.
39.0 Formulate and assemble initial entity relationship by expanding on modeling concepts.
40.0 Consider the degree and optionality of relationships of entities.
41.0 Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams.
42.0 Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships.
43.0 Apply the complex ERM information by fine-tuning entities and the process for relating them.
44.0 Apply initial database design and normalization by following the set of house rules that determine how items are stored and retrieved.
45.0 Manipulating data.
46.0 Building and modifying tables.
47.0 Performing queries and filtering records.
48.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
49.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
50.0 Explain the importance of employability skill and entrepreneurship skills.
51.0 Demonstrate personal money-management concepts, procedures, and strategies.
52.0 Plan program design.
53.0 Code programs.
54.0 Test programs.
55.0 Perform program maintenance.
56.0 Create and maintain documentation.
57.0 Develop an awareness of software quality assurance.
58.0 Develop an understanding of programming techniques and concepts.
59.0 Design structured programs.
60.0 Demonstrate proficiency in page design applicable to the WWW.
61.0 Demonstrate proficiency in webpage design applicable to the WWW.
62.0 Demonstrate proficiency in using a WYSIWG editor, web design, or web animation software for webpage design.
63.0 Demonstrate proficiency in using digital photography and digital imaging.
64.0 Design and create webpages suitable for publishing to the Internet.
65.0 Describe how website performance is monitored and analyzed.
66.0 Demonstrate proficiency in hosting a website.
67.0 Demonstrate the ability to attract and track traffic for a website.

68.0 Demonstrate knowledge of presentation production issues.
69.0 Demonstrate proficiency in using digital photography and digital imaging.
70.0 Demonstrate basic video production.
71.0 Demonstrate set-up and configuration of a computer for video applications.
72.0 Demonstrate the basic operation of a video workstation.
73.0 Demonstrate basic audio production.
74.0 Set-up and configure a computer for audio applications.
75.0 Operate an audio workstation.
76.0 Demonstrate proficiency in using presentation software and equipment.
77.0 Demonstrate understanding of network technologies.
78.0 Understand, install and configure network hardware.
79.0 Understand, install and configure networking devices.
80.0 Understand, install and configure network management software.
81.0 Understand, install and configure networking tools.
82.0 Install, configure, and manage network security hardware and software devices.
83.0 Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends.
84.0 Recognize the following types of malicious code and specify the appropriate actions to take to mitigate vulnerability and risk.
85.0 Recognize and be able to differentiate and explain the following access control models.
86.0 Compare and contrast methods of authentication.
87.0 Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk.
88.0 The processes and risks associated with the following security concerns and tasks.
89.0 The administration of the following types of remote access technologies.
90.0 The administration of the following email security concepts.
91.0 The administration of the following Internet security concepts.
92.0 The administration of the following vulnerabilities.
93.0 The administration of the following directory security concepts.
94.0 The administration of the following file transfer protocols and concepts.
95.0 The administration of the following wireless technologies and concepts.
96.0 Compare and contrast the following types of intrusion detection in terms of implementation and configuration.
97.0 Be able to identify the following different kinds of cryptographic algorithms.
98.0 Understand how cryptography and digital signatures address the following security concepts.
99.0 Understand the following concepts of PKI (Public Key Infrastructure).
100.0 Understand the following concepts of Key Management and Certificate Lifecycles.

Florida Department of Education
Student Performance Standards

Program Title: Applied Information Technology
Career Certificate Program Number: Y300400

Course Number: OTA0040 **Occupational Completion Point: A** **Information Technology Assistant – 150 Hours**
Information Technology Assistant (OTA0040) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 15.0) have been placed in a separate document. To access this document, visit: Information Technology Assistant (OTA0040)
Course Number: CTS0072 **Occupational Completion Point: B** **IT & Web Systems – 300 Hours**
16.0 Demonstrate proficiency on the principles of design. The student will be able to:
16.01 Identify industry best practices in visual design (e.g., color schemes, fonts, navigation methods, pagination).
16.02 Explain the key concepts of meeting client needs.
16.03 Apply the principles of Human Computer Interface (HCI) to design and develop an effective look and feel for a website.
16.04 Design and create a webpage for optimal display in multiple browsers.
17.0 Demonstrate proficiency planning an effective website. The student will be able to:
17.01 Compare and contrast site maps and wireframes.
17.02 Develop an effective site map for a website.
17.03 Create page layout wireframes for a website.
17.04 Classify web development tasks according to when they are performed during the web development cycle.
17.05 Describe the different types of business requirements that apply to website design.
17.06 Design business requirements to help ensure success for a specific website.
17.07 Demonstrate ability to use effective designer-client communication skills.
18.0 Demonstrate proficiency using web development tools and techniques. The student will be able to:
18.01 Compare and contrast writing HTML using a text editor versus using a WYSIWYG editor.
18.02 Design and create an effective webpage template.

	18.03 Create attractive, engaging, and efficient webpages using a WYSIWYG editor.
	18.04 Create an appropriate directory structure, naming convention protocol, and file organization for a website.
	18.05 Create DHTML and XML documents using editors or converters.
19.0	Demonstrate proficiency using specialized web design software. The student will be able to:
	19.01 Compare and contrast various specialized web design software (e.g., Photoshop, Dreamweaver).
	19.02 Demonstrate proficiency using various specialized web design software (e.g., Photoshop, Dreamweaver).
20.0	Demonstrate proficiency gathering and preparing and evaluating web content. The student will be able to:
	20.01 Characterize effective writing styles and conventions for the web.
	20.02 Create effective written content for the web.
	20.03 Prepare various types of graphical content for use on a webpage.
	20.04 Access and digitize graphics through various resources (e.g., scanner, digital cameras, on-line graphics, clipart, CD-ROMs).
	20.05 Create and edit images using image or graphic design software.
	20.06 Compare and contrast static versus dynamic web content.
	20.07 Evaluate sources for accuracy of content.
21.0	Demonstrate an awareness of preparing a website for launch. The student will be able to:
	21.01 Evaluate a website for basic usability and accessibility issues.
	21.02 List the steps that are necessary to determine when a website is ready to launch.
	21.03 Develop a User Testing Plan.
	21.04 Demonstrate the ability to organize and execute a user testing of a website in multiple browsers.
22.0	Explain motherboard components, types and features. The student will be able to:
	22.01 Identify different motherboard form factors (ATX/BTX and micro ATX).
	22.02 Identify input/output interfaces (e.g. USB, serial, NIC).
	22.03 Identify the different types of bus slots (e.g. PCI, AGP, PCMCIA).
	22.04 Identify the BIOS/CMOS/Firmware (e.g. POST, CMOS battery).
23.0	Explain the purpose and characteristics of CPUs and their features. The student will be able to:
	23.01 Identify types of CPUs (e.g. AMD, Intel).
	23.02 Define hyper threading.
	23.03 Explain multi core (e.g. dual, triple, quad).

	23.04 Explain the difference between onboard cache (e.g. L1, L2, L3).
	23.05 Compare and contrast between real and actual speed.
	23.06 Compare and contrast between 32 bit and 64 bit processing.
24.0	Perform installation and configuration activities. The student will be able to:
	24.01 Install and configure software including device drivers.
	24.02 Install and configure operating system software.
	24.03 Install and configure application software.
	24.04 Install and configure peripherals including device drivers (e.g., scanners, cameras, printers).
	24.05 Supervise the testing of operating system management systems (e.g., registry, INI files).
	24.06 Prepare the hard disk and related issues for operating system installation (e.g., BIOS, disk controllers).
	24.07 Format and partition the hard disk.
	24.08 Verify the proper operation of the system (e.g., physical inspection, tests, utilities).
	24.09 Compare and contrast memory technologies (e.g., RAM, ROM, virtual memory, memory management).
	24.10 Demonstrate proficiency using various memory technologies (e.g., RAM, ROM, virtual memory, memory management).
	24.11 Demonstrate proper use of user interfaces, command utilities and troubleshooting utilities.
	24.12 Explain the basics of boot sequences, methods and startup utilities.
25.0	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:
	25.01 Identify, troubleshoot and propose solutions for configuration problems.
	25.02 Identify, troubleshoot and propose solutions for software problems.
	25.03 Identify, troubleshoot and propose solutions for hardware malfunctions.
	25.04 Identify, troubleshoot and propose solutions for network malfunctions.
	25.05 Plan and implement a system upgrade and downgrade.
	25.06 Evaluate data recovery using various techniques (e.g., MBR repair tools, rescue disks, disk image, backup).
	25.07 Organize and perform system maintenance activities (e.g., management console, SNMP, system monitors, diagnostics, virus management).
	25.08 Demonstrate corporate interaction proficiency (e.g., responsibility, interaction, communication).
26.0	Demonstrate knowledge of presentation production issues. The student will be able to:
	26.01 Demonstrate knowledge of copyright laws including copyright statute, disclaimers, and filing procedure.

	26.02	Demonstrate an understanding of graphic and other file formats (e.g., EPS, TIFF, JPEG, PNG, ASCII, MPEG, MIDI, AVI, WAV,) and knowledge of image size when scanning and saving files for use in different presentation types (web, computer, print).
	26.03	Identify display device connectors and types.
	26.04	Define refresh rate, resolution, multi-monitor and Degauss.
	26.05	Demonstrate knowledge of presentation vocabulary/terms.
	26.06	Compare and contrast and utilize various audio/video output solutions and devices.
	26.07	Compare and contrast removable storage.
27.0	Demonstrate proficiency using computer networks. The student will be able to:	
	27.01	Define networking and describe the purpose of a network.
	27.02	Describe the conceptual background of digital networks including terminology and basics.
	27.03	Describe various types of networks and the advantages and disadvantages of each.
	27.04	Describe the use, advantages, and disadvantages of various network media.
	27.05	Describe the function of various network devices.
	27.06	Describe the difference between the internet and intranet.
	27.07	Compare and contrast IP Version 6 and IP Version 4.
	27.08	Compare and contrast the different network types.
	27.09	Compare and contrast various implementation models.
28.0	Demonstrate proficiency communicating over the Internet. The student will be able to:	
	28.01	Display understanding of how Internet Service Providers (ISP) operate and what role they play in enabling users to connect to the Internet.
	28.02	Explain how the Internet works and how documents are connected and transferred.
	28.03	Configure an email client for SMTP and POP3 servers, including port assignment.
	28.04	Explain how the primary modes of Internet communication are used.
29.0	Demonstrate proficiency in troubleshooting, repair and maintenance of hardware. The student will be able to:	
	29.01	Determine the troubleshooting methods and tools for peripheral devices.
	29.02	Explain and interpret common device issues and basic troubleshooting methods.
	29.03	Integrate common preventative maintenance techniques.
30.0	Demonstrate proficiency in the basic principles of security concepts and technologies. The student will be able to:	
	30.01	Evaluate encryption technologies, software firewall, authentication technologies, and data security.

	30.02 Summarize the following security features (e.g. encryption, malicious software protection BIOS security, password management, biometrics).
31.0	Demonstrate proficiency in operational procedures as they relate to computer equipment and components. The student will be able to:
	31.01 Compare and contrast ESD, EMI, RFI, and electrical safety.
	31.02 Demonstrate proficiency in the use of state regulations for hazardous materials.
32.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas. The student will be able to:
	32.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
	32.02 Locate, organize and reference written information from various sources.
	32.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences.
	32.04 Interpret verbal and nonverbal cues/behaviors that enhance communication.
	32.05 Apply active listening skills to obtain and clarify information.
	32.06 Develop and interpret tables and charts to support written and oral communications.
	32.07 Exhibit public relations skills that aid in achieving customer satisfaction.
33.0	Solve problems using critical thinking skills, creativity and innovation. The student will be able to:
	33.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.
	33.02 Employ critical thinking and interpersonal skills to resolve conflicts.
	33.03 Identify and document workplace performance goals and monitor progress toward those goals.
	33.04 Conduct technical research to gather information necessary for decision-making.
34.0	Use information technology tools. The student will be able to:
	34.01 Use personal information management (PIM) applications to increase workplace efficiency.
	34.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email and internet applications.
	34.03 Employ computer operations applications to access, create, manage, integrate and store information.
	34.04 Employ collaborative/groupware applications to facilitate group work.
35.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The student will be able to:
	35.01 Describe the nature and types of business organizations.
	35.02 Explain the effect of key organizational systems on performance and quality.
	35.03 List and describe quality control systems and/or practices common to the workplace.

	35.04 Explain the impact of the global economy on business organizations.
36.0	Describe the importance of professional ethics and legal responsibilities. The student will be able to:
	36.01 Evaluate and justify decisions based on ethical reasoning.
	36.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
	36.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace or on social media.
	36.04 Interpret and explain written organizational policies and procedures.
Course Number: CTS0063 Occupational Completion Point: C Database Essentials – 150 Hours	
37.0	Develop the "big picture" of database design and how to best organize data according to business rules and/or client needs. The student will be able to:
	37.01 Identify and analyze the phases of the database development process.
	37.02 Explain what conceptual data modeling and database design involves.
	37.03 Compare database development process with that of the application development process.
	37.04 Identify the need for databases and why they are used.
	37.05 Explain the various types of databases (i.e., flat file, relational) and the appropriate use of each.
	37.06 Demonstrate proficiency in design methodology by completing appropriate tasks during the appropriate time of the developmental life cycle.
	37.07 Demonstrate proficiency in design methodology by considering where the database will reside.
38.0	Develop the process of creating an entity by identifying relationships. The student will be able to:
	38.01 Identify and model various types of entities.
	38.02 Identify naming and drawing conventions for entities.
	38.03 Sequence the steps that are necessary for creation of an entity.
	38.04 Analyze and model the relationships between entities.
39.0	Formulate and assemble initial entity relationship by expanding on modeling concepts. The student will be able to:
	39.01 Analyze and model attributes.
	39.02 Identify unique identifiers for each entity.
	39.03 Develop an entity relationship diagram tagging attributes with optionality.
40.0	Consider the degree and optionality of relationships of entities. The student will be able to:

	40.01 Create models and entity relationship information requirements and interviews.
	40.02 Begin to differentiate between one-to-many, many-to-many and one-to-one relationships.
	40.03 Identify relationship between two entities by reading a given diagram.
	40.04 Create a relationship between instances of the same entity.
	40.05 Read an entity relationship model in order to validate it.
41.0	Demonstrate proficiency in early construction stages of the data modeling process by using unique identifiers and many-to-many (M:M) relationships for building entity relationship diagrams. The student will be able to:
	41.01 Identify the significance of an attribute that has more than one value for each entity instance.
	41.02 Evaluate appropriate methods of storing validation rules for attributes.
	41.03 Recognize unique identifiers inherited from other entities.
	41.04 Sequence the steps involved in resolving a many-to-many relationship.
42.0	Demonstrate proficiency in advanced data constructs by analyzing business requirements and diagramming entities and relationships. The student will be able to:
	42.01 Validate that an attribute is properly placed based upon its dependence on its entity's unique identifier (UID).
	42.02 Model advanced data constructs including recursive relationships, subtypes, and exclusive relationships.
	42.03 Enforce referential integrity.
43.0	Apply the complex ERM information by fine-tuning entities and the process for relating them. The student will be able to:
	43.01 Describe a relational database and how it is different from other database systems.
	43.02 Define primary keys and foreign keys and describe their purpose.
	43.03 Describe what data integrity refers to and list some constraints.
	43.04 Explain how database design fits into the database development process.
	43.05 Translate an entity-relationship model into a relational database design.
44.0	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:
	44.01 Recognize raw data and evaluate the steps for creating a data group in unnormalized form (UNF).
45.0	Manipulating data. The student will be able to:
	45.01 Determine appropriate data inputs and outputs for an existing database.
	45.02 Demonstrate proficiency in record management (i.e., entering, editing, finding, selecting, sorting, deleting records).
	45.03 Change the layout of a datasheet.
	45.04 Create forms, reports, mailing labels, and charts using a database.

	45.05 Export data to appropriate software applications.
	45.06 Demonstrate proficiency in coordinating databases with appropriate software applications.
46.0	Building and modifying tables. The student will be able to:
	46.01 Create a database table.
	46.02 Create table structures and establish table relationships.
	46.03 Determine fields and assign data types in a database table.
	46.04 Demonstrate appropriate manipulation of database tables (i.e., enter data, add, delete records).
	46.05 Modify a database table by adding, deleting and removing fields.
	46.06 Demonstrate proficiency in the appropriate use of database wizards.
47.0	Performing queries and filtering records. The student will be able to:
	47.01 Design a query and extract specific data from a database table.
	47.02 Create a calculated field.
	47.03 Filter data in records by selection and by form.
	47.04 Modify a saved query.
	47.05 Explain what a Database Warehouse and its uses.
48.0	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:
	48.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	48.02 Explain emergency procedures to follow in response to workplace accidents.
	48.03 Create a disaster and/or emergency response plan.
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.
	49.04 Employ mentoring skills to inspire and teach others.
50.0	Explain the importance of employability skill and entrepreneurship skills. The student will be able to:
	50.01 Identify and demonstrate positive work behaviors needed to be employable.
	50.02 Develop personal career plan that includes goals, objectives and strategies.
	50.03 Examine licensing, certification and industry credentialing requirements.

	50.04 Maintain a career portfolio to document knowledge, skills and experience.
	50.05 Evaluate and compare employment opportunities that match career goals.
	50.06 Identify and exhibit traits for retaining employment.
	50.07 Identify opportunities and research requirements for career advancement.
	50.08 Research the benefits of ongoing professional development.
	50.09 Examine and describe entrepreneurship opportunities as a career planning option.
51.0	Demonstrate personal money-management concepts, procedures, and strategies. The student will be able to:
	51.01 Identify and describe the services and legal responsibilities of financial institutions.
	51.02 Describe the effect of money management on personal and career goals.
	51.03 Develop a personal budget and financial goals.
	51.04 Complete financial instruments for making deposits and withdrawals.
	51.05 Maintain financial records.
	51.06 Read and reconcile financial statements.
	51.07 Research, compare and contrast investment opportunities.
Course Number: CTSS0030 Occupational Completion Point: D Programming Fundamentals – 150 Hours	
52.0	Plan program design. The student will be able to:
	52.01 Formulate a plan to determine program specifications individually or in groups.
	52.02 Use a graphical representation or pseudocode to represent the structure in a program or subroutine.
	52.03 Design programs to meet business needs and requirements using problem-solving strategies.
	52.04 Prepare proper input/output layout specifications.
	52.05 Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
	52.06 Analyze the business needs and requirements.
	52.07 Determine what kind of information the desired program must process.
	52.08 Formulate concise descriptions of a program's task and purpose.
	52.09 Formulate concise descriptions of task and purpose of a program's pieces.
	52.10 Organize programs according to the problem analysis.

	52.11 Recognize changes in the problem statement.
	52.12 Suggest changes in the program organization.
53.0	Code programs. The student will be able to:
	53.01 Write programs according to recognized programming standards.
	53.02 Write internal documentation statements as needed in the program source code.
	53.03 Code programs using logical statements (e.g., If-Then-Else, Do…While).
	53.04 Enter and modify source code using a program language editor.
	53.05 Code routines within programs that validate input data.
	53.06 Code programs using object-oriented languages (techniques).
	53.07 Select the essential aspects of a problem statement.
	53.08 Provide a solution to a problem.
	53.09 Find solutions to an extended problem statement.
	53.10 Utilize reference manuals and help systems.
	53.11 Use pre-defined functions within programs.
54.0	Test programs. The student will be able to:
	54.01 Develop a plan for testing programs.
	54.02 Develop data for use in program testing.
	54.03 Perform debugging activities.
	54.04 Distinguish among the different types of program and design errors.
	54.05 Evaluate program test results.
	54.06 Execute programs and subroutines as they relate to the total application.
	54.07 Develop examples that illustrate the core behavior of each program.
	54.08 Develop examples that illustrate the core behavior of each program component.
	54.09 Illustrate the behavior of boundary cases.
	54.10 Demonstrate an understanding that engineering artifacts requires rigorous and systematic testing.
	54.11 Use examples to show that the solution meets pre-determined criteria.
	54.12 Demonstrate understanding that testing can expose problems but not prove the correctness of the design in an absolute sense.
	54.13 Compile (interpret) and run programs.

55.0	Perform program maintenance. The student will be able to:
55.01	Analyze output to identify and annotate errors or enhancements.
56.0	Create and maintain documentation. The student will be able to:
56.01	Follow established documentation standards.
57.0	Develop an awareness of software quality assurance. The student will be able to:
57.01	Identify the legal and social consequences of errors in software.
57.02	Describe copyright and other laws that relate to software theft and misuse.
57.03	Describe software security measures to protect computer systems and data from unauthorized use and tampering (e.g., physical security, passwords, encryption, virus protection/prevention).
57.04	Develop an awareness of version control systems and Open Source Software.
58.0	Develop an understanding of programming techniques and concepts. The student will be able to:
58.01	Identify the basic constructs used in structured programming.
59.0	Design structured programs. The student will be able to:
59.01	Design programs that model mathematical relationships from application areas (e.g., accounting, economics, multimedia, programming, science, web).
59.02	Design programs that deal with multi-faceted objects (e.g., personnel records, physical objects, attributes of HTML tags).
59.03	Design programs that deal with mixed classes of objects (e.g., a class of geometric shapes containing circles, rectangles, triangles, squares, polygons).
59.04	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**	
60.0	Demonstrate proficiency in page design applicable to the WWW. The student will be able to:
60.01	Identify and convert graphic formats.
60.02	Demonstrate proficiency in adding Java scripts to webpages.
61.0	Demonstrate proficiency in webpage design applicable to the WWW. The student will be able to:
61.01	Determine the objectives and the audience for webpages.
61.02	Identify design strategies to reach and keep an audience.
61.03	Use storyboarding to plan a website.

	61.04 Create styles and other design elements (e.g. backgrounds, colors, fonts, buttons).
62.0	Demonstrate proficiency in using a WYSIWG editor, web design, or web animation software for webpage design. The student will be able to:
	62.01 Apply style sheets for consistent website design.
	62.02 Create and edit images and photographs for webpages using digital imaging software (e.g., ImageReady in Photoshop).
	62.03 Insert audio files into a webpage.
	62.04 Create, edit and integrate video files into a webpage.
	62.05 Create, edit and integrate animation files into a webpage.
	62.06 Demonstrate an understanding of photograph compression factors such as transmission speed, color reduction, and browser support.
	62.07 Demonstrate knowledge of image formats related to photos and graphics on the Internet (e.g. Graphic formats (TIFF & EPS), Web formats (JPEG, GIF, PNG).
	62.08 Save and export a photograph to the web in the format best for image quality and file size.
	62.09 Build, optimize, edit, and test web pages for publication.
	62.10 Create a webpage that utilizes plug-ins.
	62.11 Demonstrate an understanding of network and web implementation issues (e.g., bandwidth, compression, streaming).
	62.12 Compare and contrast various methods by which information may be accessed on the Internet/Intranet (e.g., FTP, telnet, browser).
	62.13 Demonstrate an understanding of file encryption methods (e.g., secure server, unsecured server).
63.0	Demonstrate proficiency in using digital photography and digital imaging. The student will be able to:
	63.01 Demonstrate knowledge of ethics related to digital imaging, legal and consent issues.
	63.02 Apply effective design principles in digital photography compositions.
	63.03 Illustrate the essence of an event, quote, or slogan through digital photography/imaging.
	63.04 Demonstrate skill in using digital imaging software for image manipulation, color correction and special effects to creatively convey a message or literary interpretation.
	63.05 Demonstrate skill in scanning and cropping photographs.
64.0	Design and create webpages suitable for publishing to the Internet. The student will be able to:
	64.01 Explain the need for web-based applications.
	64.02 Evaluate a website for basic usability and accessibility issues.
	64.03 Display an understanding of the purposes of site maps and wireframes.
	64.04 Develop an effective site map for a website.

	64.05 Develop effective wireframes for a website.
	64.06 Identify industry best practices in visual design.
	64.07 Explain the key concepts of meeting client needs.
	64.08 Develop an effective look and feel for a website.
	64.09 Develop an effective webpage template.
	64.10 Describe a correct directory structure, naming convention protocol and file organization for a website.
	64.11 Characterize effective writing for the web.
	64.12 Create effective written content for the web.
	64.13 Decide how to best prepare various types of graphical content for use on a web page.
	64.14 Develop a User Testing Plan.
	64.15 List the steps that are necessary to determine when a website is ready to launch.
	64.16 Demonstrate the ability to organize and execute a user testing of a website.
65.0	Describe how website performance is monitored and analyzed. The student will be able to:
	65.01 Identify issues related to website maintenance.
	65.02 Use webpage validation tools.
	65.03 Describe website performance metrics (e.g., visits, time-on-page, time-on-site) and discuss their design implications.
	65.04 Demonstrate knowledge of accessibility problems and solutions.
	65.05 Examine indexing, page ranking, basic Search Engine Optimization techniques.
	65.06 Explore common website analytic tools.
	65.07 Construct webpages with streaming media content.
66.0	Demonstrate proficiency in hosting a website. The student will be able to:
	66.01 Apply professional guidelines to choose, search for and register a domain name.
	66.02 Evaluate criteria upon which to select an appropriate web host.
	66.03 Make generalizations about optimal download speed for a particular website.
	66.04 Demonstrate the ability to upload and download files using FTP protocol.
	66.05 Develop a Maintenance Plan for a client.
67.0	Demonstrate the ability to attract and track traffic for a website. The student will be able to:
	67.01 Explain and describe the best practices for attracting traffic to websites.

67.02	Evaluate an effective search engine optimization strategy.
67.03	Describe tactics for building online credibility.
67.04	Explain how to use standard techniques to gather and/or track site statistics.
Course Number: CTS0075 Occupational Completion Point: F Multimedia Systems – 150 Hours	
68.0	Demonstrate knowledge of presentation production issues. The student will be able to:
68.01	Identify characteristics of various types of presentations (e.g., informing, selling, teaching, entertaining).
68.02	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, webpages).
68.03	Identify design characteristics (e.g., fonts, size and styles, backgrounds) that are suited for each type of presentation format and material.
68.04	Demonstrate knowledge of copyright laws including copyright statute, disclaimers, and filing procedures.
68.05	Research and identify skills needed for career positions in multimedia.
68.06	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).
68.07	Demonstrate knowledge of presentation vocabulary/terms.
69.0	Demonstrate proficiency in using digital photography and digital imaging. The student will be able to:
69.01	Demonstrate knowledge of ethics related to digital imaging, legal and consent issues.
69.02	Apply effective design principles in digital photography compositions.
69.03	Illustrate the essence of an event, quote, or slogan through digital photography/imaging.
69.04	Demonstrate skill in using digital imaging software for image manipulation, color correction, and special effects to creatively convey a message or literary interpretation.
69.05	Demonstrate skill in scanning and cropping photographs.
69.06	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.
70.0	Demonstrate basic video production. The student will be able to:
70.01	Use student device or current industry standard production video equipment.
70.02	Operate camera in studio and location (field) production environments.
70.03	Demonstrate understanding of digital video storage concepts and digital storage media.

	70.04 Demonstrate knowledge of and the ability to operate digital recording decks, and other digital storage devices.
	70.05 Identify and select microphones for production needs.
	70.06 Determine appropriate lighting needs for production settings.
	70.07 Identify location and studio lighting types, method of use and application.
71.0	Demonstrate set-up and configuration of a computer for video applications. The student will be able to:
	71.01 Install basic peripheral devices related to video programs.
	71.02 Install and configure software related to video programs.
	71.03 Demonstrate basic knowledge of computer system requirements.
	71.04 Demonstrate basic knowledge of installing plug-ins or additional audio source material such as beats and or samples.
	71.05 Understand the signal flow of a digital video workstation.
72.0	Demonstrate the basic operation of a video workstation. The student will be able to:
	72.01 Demonstrate knowledge of the digital video workstation interface.
	72.02 Demonstrate a working familiarity and understanding of the function and operation of digital video workstations.
	72.03 Describe a full digital media production cycle.
	72.04 Demonstrate ability to edit, cut, erase, and insert video utilizing various digital production techniques.
	72.05 Record video directly to the digital video workstation.
	72.06 Demonstrate knowledge of editing video according to message.
	72.07 Demonstrate skill in using video effects and plug-ins.
	72.08 Describe a first complete run-through of the video production process.
	72.09 Characterize the qualities of effective communication in a completed video.
	72.10 Prepare a video project for final compositing and export.
	72.11 Transfer video files between various video software applications.
	72.12 Export finished video.
	72.13 Identify and describe solutions to the challenges and obstacles that arise in a video production.
73.0	Demonstrate basic audio production. The student will be able to:
	73.01 Describe digital audio storage concepts and digital storage media.
	73.02 Operate digital recording decks and other digital storage devices.
	73.03 Describe the function and operation of digital audio workstations.

	73.04 Edit, cut, erase and insert sound utilizing various digital production techniques.
	73.05 Perform digital noise reduction and noise extraction via spectral display.
74.0	Set-up and configure a computer for audio applications. The student will be able to:
	74.01 Install basic peripheral devices related to audio programs.
	74.02 Install and configure software related to audio programs.
	74.03 Demonstrate basic knowledge of computer system requirements.
	74.04 Install plug-ins or additional audio source material such as beats and or samples.
	74.05 Diagram the signal flow of a digital audio workstation.
75.0	Operate an audio workstation. The student will be able to:
	75.01 Demonstrate knowledge of the digital audio workstation interface.
	75.02 Create and arrange a multi-track project.
	75.03 Create interest and effect using editing techniques
	75.04 Design and edit audio using a waveform editor.
	75.05 Record audio directly to the digital audio workstation.
	75.06 Mix audio.
	75.07 Demonstrate skill in using audio effects and plug-ins.
	75.08 Prepare an audio project for finishing and final mix down.
	75.09 Transfer audio files between various audio software applications.
	75.10 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.
	75.11 Export finished audio.
76.0	Demonstrate proficiency in using presentation software and equipment. The student will be able to:
	76.01 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.
	76.02 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).
	76.03 Collaborate with team members to plan, edit, evaluate, and present a multimedia presentation.

Course Number: CTS0025 Occupational Completion Point: G Computer Networking – 150 Hours	
77.0	Demonstrate understanding of network technologies. The student will be able to:
77.01	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.
77.02	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.
77.03	Identify the following address formats IPv6, IPv4, and MAC Addressing.
77.04	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.
77.05	Identify common IPv4 and IPv6 routing protocols - Link state OSPF, IS-IS, Distance vector, RIP, RIPv2, BGP and Hybrid EIGRP.
77.06	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).
77.07	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.
78.0	Understand, install, and configure network hardware. The student will be able to:
78.01	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.
78.02	Identify common connector types such as RJ-11, RJ-45, BNC, SC, ST, LC and RS-232.
78.03	Identify common physical network topologies such as Star, Mesh, Bus, Ring, Point to Point, Point to Multipoint, and Hybrid.
78.04	Differentiate and implement appropriate wiring standards such as 568A, 568 B Straight vs cross over, rollover, and Loopback.
78.05	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.
78.06	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.
78.07	Explain common logical network topologies and their characteristics such as peer to peer, client/server, VPN and VLAN.
78.08	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.
79.0	Understand, install and configure networking devices. The student will be able to:
79.01	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.

	79.02	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.
	79.03	Explain the advance features of a switch such as PoE, Spanning tree, VLAN, Trunking, Port mirroring, and Port Authentication.
	79.04	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.
80.0	Understand, install and configure network management software. The student will be able to:	
	80.01	Explain the function of the OSI layer model such as physical, data link, network, transport, session, presentation and application.
	80.02	Identifies types of configuration management documentation such as wiring schematics, physical and logical network diagram, baselines, policies, procedure and configuration and regulations.
	80.03	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.
	80.04	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.
	80.05	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.
	80.06	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.
	80.07	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.
	80.08	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.
81.0	Understand, install and configure networking tools. The student will be able to:	
	81.01	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.
	81.02	Explain the purpose of network scanners such as Packet sniffers, Intrusion detection software, Intrusion prevention software and Port scanners.
	81.03	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.
82.0	Install, configure, and manage network security hardware and software devices. The student will be able to:	
	82.01	Explain the function of hardware and software security devices such as Network based firewall, Host based firewall, IDS, IPS, and

		VPN concentrator.
	82.02	Explain common features of a firewall for example: Application layer vs. network layer, Stateful vs. stateless, Scanning services, Content filtering, Signature identification, and Zones.
	82.03	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.
	82.04	Explain methods of user authentication using the following methods: PKI, Kerberos, AAA, RADIUS, TACACS+, Network access control, 802.1x, CHAP, MS-CHAP, and EAP.
	82.05	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.
	82.06	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**		
83.0		Demonstrate an understanding of cybersecurity, the terminology used, its history and culture, and trends. The student will be able to:
	83.01	Describe the history of cybersecurity, including the evolution of a hacker culture.
	83.02	Discuss the trends and national initiatives related to cybersecurity.
	83.03	Distinguish between information assurance and cybersecurity.
	83.04	Describe the concepts of confidentiality as it relates to user and data impact.
	83.05	Explain authentication and the concept of non-repudiation.
	83.06	Describe the concept of “Hacking - The Human Element” and elaborate on its implications to cybersecurity.
84.0		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:
	84.01	Describe viruses.
	84.02	Identify Trojan Horses.
	84.03	Explain Logic Bombs.
	84.04	Describe worms.
	84.05	Explain exploit kits.
	84.06	Identify kill chains.
85.0		Recognize and be able to differentiate and explain the following access control models. The student will be able to:

	85.01 Define MAC (Mandatory Access Control).
	85.02 Define DAC (Discretionary Access Control).
	85.03 Define RBAC (Role Based Access Control).
86.0	Compare and contrast methods of authentication. The student will be able to:
	86.01 Identify Kerberos.
	86.02 Explain CHAP (Challenge Handshake Authentication Protocol).
	86.03 Define certificates.
	86.04 Apply username/password.
	86.05 Identify tokens.
	86.06 Describe multi-factor.
	86.07 Define mutual.
	86.08 Define biometrics.
87.0	Recognize the following attacks and specify the appropriate actions to take to mitigate vulnerability and risk. The student will be able to:
	87.01 Explain DOS/DDOS (Denial of Service/Distributed Denial of Service).
	87.02 Explain Back Door.
	87.03 Identify spoofing.
	87.04 Describe Man in the Middle.
	87.05 Describe replay.
	87.06 Explain TCP/IP Hijacking.
	87.07 List Weak Keys.
	87.08 Design password security measures to eliminate guessing (e.g., Brute Force, Dictionary, Mathematical, Social Engineering, Birthday).
	87.09 Describe Software Exploitation.
88.0	The he processes and risks associated with the following security concerns and tasks. The student will be able to:
	88.01 Identify non-essential services and protocols and know what actions to take to reduce the risks of those services and protocols.
	88.02 Understand the concept of and know how reduce the risks of social engineering.
	88.03 Understand the concept and significance of auditing, logging and system scanning.
	88.04 Identify and be able to differentiate different cryptographic standards and protocols.
89.0	The administration of the following types of remote access technologies. The student will be able to:

	89.01 Recognize 802.1x.
	89.02 Understand VPN (Virtual Private Network).
	89.03 Discuss RADIUS (Remote Authentication Dial-In User Service).
	89.04 Describe TACACS (Terminal Access Controller Access Control System).
	89.05 Generalize L2TP/PPTP (Layer Two Tunneling Protocol/Point to Point Tunneling Protocol).
	89.06 Define SSH (Secure Shell).
	89.07 Give examples of IPSEC (Internet Protocol Security).
	89.08 List security vulnerabilities.
90.0	The administration of the following email security concepts. The student will be able to:
	90.01 Explain S/MIME (Secure Multipurpose Internet Mail Extensions).
	90.02 Describe PGP (Pretty Good Privacy) like technologies.
	90.03 List security vulnerabilities.
	90.04 Identify SPAM.
	90.05 Analyze hoaxes.
	90.06 Track SMTP headers.
91.0	The administration of the following Internet security concepts. The student will be able to:
	91.01 Recognize SSL/TLS (Secure Sockets Layer/Transport Layer Security).
	91.02 Understand HTTP/S (Hypertext Transfer Protocol/Hypertext Transfer Protocol over Secure Sockets Layer).
	91.03 List security vulnerabilities.
92.0	The administration of the following vulnerabilities. The student will be able to:
	92.01 Discuss Java Script.
	92.02 Explain ActiveX.
	92.03 Identify Buffer Overflows.
	92.04 Understand Cookies.
	92.05 Explain Signed Applets.
	92.06 Identify CGI (Common Gateway Interface).
	92.07 Describe SMTP (Simple Mail Transfer Protocol) Relay.
93.0	The administration of the following directory security concepts. The student will be able to:

	93.01 Recognize SSL/TLS (Secure Sockets Layer/Transport Layer Security).
	93.02 Recognize LDAP (Lightweight Directory Access Protocol).
94.0	The administration of the following file transfer protocols and concepts. The student will be able to:
	94.01 Identify S/FTP (File Transfer Protocol).
	94.02 Identify Blind FTP (File Transfer Protocol)/Anonymous.
	94.03 Understand File Sharing.
	94.04 List security vulnerabilities.
95.0	The administration of the following wireless technologies and concepts. The student will be able to:
	95.01 Recognize WTLS (Wireless Transport Layer Security).
	95.02 Recognize 802.11 and 802.11x.
	95.03 Recognize WEP/WAP (Wired Equivalent Privacy/Wireless Application Protocol).
	95.04 List security vulnerabilities.
96.0	Compare and contrast the following types of intrusion detection in terms of implementation and configuration. The student will be able to:
	96.01 Discuss Network Based – Active and Passive.
	96.02 Discuss Host Based – Active and Passive.
	96.03 Explain Honey Pots.
	96.04 Describe Incident Response.
97.0	Be able to identify and explain the following different kinds of cryptographic algorithms. The student will be able to:
	97.01 Explain Hashing.
	97.02 Explain Symmetric.
	97.03 Explain Asymmetric.
98.0	Understand how cryptography and digital signatures address the following security concepts. The student will be able to:
	98.01 Discuss confidentiality.
	98.02 Evaluate integrity.
	98.03 Determine authentication.
	98.04 Ensure non-repudiation.
	98.05 Evaluate access control.
99.0	Understand the following concepts of PKI (Public Key Infrastructure). The student will be able to:

	99.01 Explain certificates (e.g., policies, practice statements).
	99.02 Discuss revocation.
	99.03 Identify trust models.
100.0	Understand the following concepts of Key Management and Certificate Lifecycles. The student will be able to:
	100.01 Compare and contrast centralized versus decentralized.
	100.02 Compare and contrast hardware versus software key storage.
	100.03 Explain private key storage.
	100.04 Identify escrow.
	100.05 Explain expiration.
	100.06 Compare and contrast revocation versus suspension (e.g., status checking).
	100.07 Interpret recovery authorization schema (e.g., M-of-N Control - Of M appropriate individuals, N must be present to authorize recovery).
	100.08 Explain renewal.
	100.09 Give examples of destruction.
	100.10 Discuss key usage.
	100.11 Compare and contrast 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 (PBL) and Business Professionals of America (BPA) are the co-curricular student organizations providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

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

Basic Skills

In Career Certificate 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: Computation (Mathematics) and Communication (Reading and Language Arts). 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, 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, 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, F.S.

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.