

**Florida Department of Education
Curriculum Framework**

The standards and/or benchmarks for this program were updated for the 2026-27 academic year.

Program Title: Cloud Computing & Virtualization
Program Type: Career Preparatory
Career Cluster: Information Technology

Career Certificate Program		
Program Number	Y100400	
CIP Number	0511090200	
Grade Level	30, 31	
Program Length	900 hours	
Teacher Certification	Refer to the Program Structure section.	
CTSO	PBL, BPA	
SOC Codes (all applicable)	Please see the Master Credential List for this program's assigned SOC codes. https://careersourceflorida.com/boardroom/florida-credentials-review-committee-draft/master-credentials-list/	
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 such as a Computer Support Assistant, Network Support Technician, Cloud Specialist, Cloud Virtualization Engineer in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

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

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

Program Structure

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

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

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:

			Teacher Certification	
A	OTA0040	Information Technology Assistant	OTA0040 Teacher Certifications	150 hours
B	EEV0504	Computer Support Assistant	BUS ED 1 @2	150 hours
C	CTS0026	Network Support Technician	COMPU SCI 6	150 hours
D	CTS0054	Cloud Analyst	COMP SVC 7G	150 hours
E	CTS0056	Cloud Virtualization Specialist	CYBER TECH 7G INFO TECH 7G	300 hours

Note: OTA0040 is a core.

Florida's Career Readiness Skills for CTE Programs

Employability Skills

01.0	Apply academic skills to workplace scenarios.
01.01	Use reading skills.
01.02	Use writing skills.
01.03	Use mathematical strategies and procedures.
01.04	Use scientific principles and procedures.
02.0	Design a solution to an industry problem.
02.01	Use critical thinking.
02.02	Use creativity.
02.03	Make sound decisions.
02.04	Solve problems.
02.05	Reason.
02.06	Plan and organize.
03.0	Manage resources within an industry project
03.01	Manage time.
03.02	Manage money or resources.
03.03	Manage materials.
03.04	Manage personnel.
04.0	Oversee the subcomponents, operations and output of a technical or organizational system.
04.01	Manage systems.
04.02	Monitor systems.
04.03	Improve systems.
05.0	Use information for decision making.
05.01	Locate information.
05.02	Organize information.
05.03	Use information.
05.04	Analyze information.
05.05	Communicate information.
06.0	Apply relevant technology to workplace scenarios to aid productivity.
06.01	Use technology.
07.0	Interpret and express interpersonal communication.
07.01	Communicate verbally.
07.02	Listen actively.
07.03	Comprehend written material.
07.04	Convey information in writing.
07.05	Communicate nonverbally.
07.06	Interpret nonverbal communication.

08.0	Interact with others to accomplish workplace goals.
08.01	Collaborate with others in a team.
08.02	Respond to customer needs.
08.03	Exercise leadership.
08.04	Negotiate to resolve conflict.
08.05	Respect others.
09.0	Manage personal behavior to maximize productivity and professional growth.
09.01	Demonstrate responsibility and self-discipline.
09.02	Adapt and show flexibility.
09.03	Work independently.
09.04	Demonstrate a willingness to learn.
09.05	Demonstrate integrity.
09.06	Demonstrate professionalism.
09.07	Take initiative.
09.08	Display positive attitude.
09.09	Take responsibility for professional growth.
Job Attainment	
10.0	Find, assess and apply to job opportunities.
10.01	Identify online job posts relevant to his or her career aspirations.
10.02	Compare and contrast the job posts' required qualifications, job duties, compensation, benefits and employers.
10.03	Define what information, documentation and writing prompts are required for the positions.
11.0	Communicate personal competence, character and fit for a job opportunity.
11.01	Develop a resume.
11.02	Write a cover letter.
11.03	Curate a professional portfolio that includes work products.
11.04	Prepare for and experience a mock job interview.
12.0	Cultivate and leverage relationships to professionally advance.
12.01	Request a signed reference letter, letter of recommendation and/or an online skill/professionalism endorsement.
12.02	Develop a plan to cultivate a professional digital footprint.
12.03	Develop a networking plan for a specific industry of interest.

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 Demonstrate an understanding of networks.
- 03.0 Use word processing applications to enhance the effectiveness of various types of documents and communication.
- 04.0 Use presentation applications to enhance communication skills.
- 05.0 Use spreadsheet applications to enhance communication skills.
- 06.0 Use database applications to store and organize data.
- 07.0 Use electronic mail to enhance communication skills.
- 08.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
- 09.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
- 10.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
- 11.0 Develop awareness of computer languages, web-based and software applications, and emerging technologies.
- 12.0 Demonstrate comprehension and communication skills.
- 13.0 Use social media to enhance online communication and develop an awareness of a digital footprint.
- 14.0 Develop an awareness of the fundamentals of cybersecurity.
- 15.0 Investigate emerging technologies and their impact on the world.
- 16.0 Incorporate appropriate leadership, customer-service strategies and professional ethics to enhance workplace performance.
- 17.0 Install, configure, and upgrade desktop and mobile computer systems following industry-standard procedures.
- 18.0 Diagnose and troubleshoot hardware, software, and connectivity problems.
- 19.0 Apply safety, maintenance, and environmental sustainability practices.
- 20.0 Demonstrate understanding of processors, memory and storage technologies.
- 21.0 Demonstrate knowledge of printing and imaging systems.
- 22.0 Demonstrate basic networking concepts and connectivity skills.
- 23.0 Provide effective end-user assistance.
- 24.0 Demonstrate proficiency using modern graphical user interfaces and productivity tools.
- 24.0
- 25.0 Incorporate leadership, supervision, customer-service strategies, and ethical standards to enhance workplace performance.
- 26.0 Participate in work-based learning experiences.
- 27.0 Perform end-user support through multiple communication channels.
- 28.0 Install and configure operating systems and network services.
- 29.0 Demonstrate proficiency using network standards and protocols.
- 30.0 Configure and troubleshoot hardware devices and drivers.
- 31.0 Monitor and optimize system performance and reliability.

- 32.0 Manage and troubleshoot storage and user data.
- 33.0 Configure and troubleshoot network connections.
- 34.0 Implement and troubleshoot system and network security.
- 35.0 Demonstrate effective communication in technical environments.
- 36.0 Apply critical thinking and problem-solving skills.
- 37.0 Use information technology tools to enhance productivity and collaboration.
- 38.0 Describe organizational roles and team dynamics in IT environments.
- 39.0 Demonstrate professional ethics and legal responsibilities in IT support.
- 40.0 Evaluate and analyze cloud principles used in cloud computing.
- 41.0 Identify the components of cloud-based services.
- 42.0 Evaluate cloud-based services.
- 43.0 Use cloud-based services.
- 44.0 Evaluate and analyze techniques and methods of cloud deployment.
- 45.0 Evaluate the risks of cloud-based systems.
- 46.0 Demonstrate an awareness of cloud implementation.
- 47.0 Demonstrate an understanding of virtualization concepts.
- 48.0 Install and configure the virtualization server platform
- 49.0 Install, configure and manage virtualized clients.
- 50.0 Demonstrate proficiency in managing a virtualization infrastructure.
- 51.0 Demonstrate an understanding of storage technologies and storage configuration.
- 52.0 Demonstrate proficiency in network optimization using network protocols, ports, and topologies.
- 53.0 Understand security in a virtualized environment.
- 25.0

**Florida Department of Education
Student Performance Standards**

Program Title: Cloud Computing & Virtualization
Career Certificate Program Number: Y100400

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: EEV0504
Occupational Completion Point – B
Computer Support Assistant – 150 Hours

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| 16.0 | Incorporate appropriate leadership, customer-service strategies and professional ethics to enhance workplace performance. The student will be able to: |
| 16.01 | Develop courteous, solution-focused communication methods when assisting customers. |
| 16.02 | Demonstrate teamwork, adaptability, and positive attitude in classroom or help-desk simulations. |
| 16.03 | Apply ethical and confidentiality standards when handling user data or credentials. |
| 16.04 | Document service requests and resolutions accurately using digital ticketing or workflow systems. |
| 17.0 | Install, configure, and upgrade desktop and mobile computer systems following industry-standard procedures. The student will be able to: |
| 17.01 | Identify major hardware components (motherboard, CPU, memory, storage, power, I/O devices) and describe their functions. |
| 17.02 | Recognize modern interface standards (USB-C, HDMI, DisplayPort, Bluetooth, Wi-Fi, Ethernet). |
| 17.03 | Assemble, disassemble, and reassemble systems safely using antistatic and ESD precautions. |
| 17.04 | Install and configure operating systems (Windows 10/11, Linux, macOS) and required drivers. |
| 17.05 | Perform system updates, backups, and recovery procedures. |
| 17.06 | Install productivity, collaboration, and endpoint-management applications. |
| 17.07 | Configure basic virtualization software for testing or lab use. |
| 17.08 | Customize user settings, accessibility features, and regional preferences. |
| 17.09 | Explain the importance of firmware/BIOS updates and secure-boot settings. |
| 18.0 | Diagnose and troubleshoot hardware, software, and connectivity problems. The student will be able to: |
| 18.01 | Diagnose and troubleshoot hardware, software, and connectivity problems. The student will be able to: |
| 18.02 | Apply structured troubleshooting methodologies to isolate faults. |
| 18.03 | Use built-in diagnostics, system logs, and Task Manager to analyze performance issues. |
| 18.04 | Troubleshoot startup failures, application crashes, and driver conflicts. |
| 18.05 | Resolve common peripheral, display, and input/output problems. |
| 18.06 | Identify symptoms of failing components and recommend replacement or repair. |

	18.07	Diagnose basic network-connectivity issues using ping, ipconfig/ifconfig, and Wi-Fi utilities.
	18.08	Apply malware-removal and remediation techniques using approved tools.
19.0		Apply safety, maintenance, and environmental sustainability practices. The student will be able to:
	19.01	Follow safe tool usage, lifting, and electrical-safety guidelines.
	19.02	Perform routine cleaning, firmware updates, and hardware checks to maintain reliability.
	19.03	Dispose of electronic waste responsibly (batteries, toner, displays) per EPA and school-district standards.
	19.04	Apply ergonomic principles for workstation design and device placement.
	19.05	Secure devices and data using cable locks, privacy screens, and password protection.
20.0		Demonstrate understanding of processors, memory, and storage technologies. The student will be able to:
	20.01	Differentiate types and speeds of RAM, cache, and storage media (SSD, NVMe, cloud).
	20.02	Install and configure internal and external storage devices.
	20.03	Explain the relationship between CPU cores, threads, and virtualization features.
	20.04	Configure and verify disk partitions and file systems.
	20.05	Describe basic redundancy concepts such as RAID and cloud backup.
21.0		Demonstrate knowledge of printing and imaging systems. The student will be able to:
	21.01	Identify common printer types (laser, inkjet, thermal, multifunction) and their use cases.
	21.02	Install and configure printers locally and on a network.
	21.03	Troubleshoot print queues, driver mismatches, and connectivity issues.
	21.04	Implement environmentally responsible printing practices and consumable recycling.
22.0		Demonstrate basic networking concepts and connectivity skills. The student will be able to:
	22.01	Define networking and describe its purpose in a business environment.
	22.02	Identify the functions of key components (switches, routers, access points, cables).
	22.03	Explain network topologies, IP addressing, and common protocols (TCP/IP, DNS, DHCP).
	22.04	Connect and configure a workstation for wired and wireless access.
	22.05	Verify network connectivity and performance using diagnostic tools.
	22.06	Describe the importance of network security measures such as firewalls and encryption.
	22.07	Perform basic data-backup and restore operations using local or cloud storage.
	22.08	Explain the purpose of disaster-recovery planning and business-continuity concepts.
23.0		Provide effective end-user assistance. The student will be able to:
	23.01	Use professional communication and active-listening techniques when supporting users.
	23.02	Gather and record accurate problem details in a service ticket.
	23.03	Provide step-by-step guidance or remote assistance for basic issues.
	23.04	Escalate unresolved problems following established procedures.
24.0		Demonstrate proficiency using modern graphical user interfaces and productivity tools. The student will be able to:
	24.01	Navigate GUI environments and customize layouts for accessibility and efficiency.
	24.02	Use menus, ribbons, and keyboard shortcuts effectively.
	24.03	Organize and maintain file structures in local and cloud directories.
	24.04	Run multiple applications, manage windows, and multitask securely.
	24.05	Access help systems, documentation, and online knowledge bases for problem-solving.

Course Number: CTS0026**Occupational Completion Point – C****– 150 Hours**

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| 25.0 | Incorporate leadership, supervision, customer-service strategies, and ethical standards to enhance workplace performance. The student will be able to: |
| 25.01 | Communicate professionally and diplomatically with customers and peers to resolve technical issues. |
| 25.02 | Demonstrate integrity, confidentiality, and professional ethics when handling client information. |
| 26.0 | Participate in work-based learning experiences. The student will be able to: |
| 26.01 | Participate in simulated or real network support projects using trouble-ticket systems and change-management workflows. |
| 26.02 | Demonstrate the use of technology tools to support end-users, including remote-support and collaboration platforms. |
| 27.0 | Provide end-user support through multiple communication channels. The student will be able to: |
| 27.01 | Perform first-response troubleshooting for hardware, software, and network issues via phone, email, chat, or remote desktop. |
| 27.02 | Document incidents accurately and follow escalation procedures. |
| 27.03 | Demonstrate effective listening and customer-service skills when assisting users. |
| 28.0 | Install and configure operating systems and network services. The student will be able to: |
| 28.01 | Install, configure, and update client operating systems (Windows 10/11, Linux Mint/Ubuntu). |
| 28.02 | Join workstations to a domain or directory service (Active Directory, Azure AD, or LDAP). |
| 28.03 | Configure Internet connectivity and basic LAN parameters (IP, DNS, gateway). |
| 28.04 | Deploy operating-system images using WDS, MDT, or cloning software. |
| 28.05 | Install and configure network applications such as file sharing, printers, and web services. |
| 28.06 | Monitor and troubleshoot shared resources and permissions. |
| 28.07 | Implement remote-management tools and assist with updates and patches. |
| 29.0 | Demonstrate proficiency using network standards and protocols. The student will be able to: |
| 29.01 | Describe the purpose of network standards (IEEE, IETF) and protocols (TCP/IP, DNS, DHCP, HTTP, FTP, SSH). |
| 29.02 | Explain the OSI and TCP/IP models and map common protocols to each layer. |
| 29.03 | Use network utilities (ping, tracert, ipconfig, nslookup, netstat) to verify connectivity. |
| 30.0 | Configure and troubleshoot hardware devices and drivers. The student will be able to: |
| 30.01 | Install and configure hardware components (NICs, storage, peripherals). |
| 30.02 | Update, roll back, or uninstall device drivers. |
| 30.03 | Troubleshoot hardware resource conflicts and compatibility issues. |
| 30.04 | Use diagnostic utilities to verify device functionality and firmware versions. |
| 31.0 | Monitor and optimize system performance and reliability. The student will be able to: |
| 31.01 | Monitor CPU, memory, disk, and network usage using built-in tools (Task Manager, Resource Monitor, Performance Monitor). |
| 31.02 | Manage startup processes and optimize system resources. |
| 31.03 | Implement scheduled maintenance tasks (cleanups, updates, defragmentation). |
| 31.04 | Perform system and user data backups and restores. |
| 32.0 | Manage and troubleshoot storage and user data. The student will be able to: |
| 32.01 | Configure user profiles and local folder redirection. |
| 32.02 | Partition and format drives; monitor and repair volumes using disk utilities. |

	32.03	Configure disk quotas and data compression.
	32.04	Recover from disk errors and restore lost data using recovery tools.
33.0		Configure and troubleshoot network connections. The student will be able to:
	33.01	Install and configure network adapters and drivers.
	33.02	Configure IP addressing (IPv4 and IPv6), subnet masks, and gateways.
	33.03	Test and troubleshoot LAN and WLAN connections using appropriate tools.
	33.04	Configure VPN clients and remote access solutions.
	33.05	Identify and resolve common network protocol issues (DNS, DHCP, HTTP, SMB).
34.0		Implement and troubleshoot system and network security. The student will be able to:
	34.01	Apply operating-system security settings, local policies, and account management.
	34.02	Configure and troubleshoot file and folder permissions and encryption (EFS, BitLocker).
	34.03	Enable auditing and review security logs.
	34.04	Implement antivirus, firewall, and endpoint protection solutions.
	34.05	Apply principles of least privilege and password/MFA policies.
35.0		Demonstrate effective communication in technical environments. The student will be able to:
	35.01	Communicate technical information clearly to non-technical users in oral and written form.
	35.02	Document troubleshooting steps and solutions using industry-standard templates.
	35.03	Deliver informal presentations or training to colleagues on IT topics.
	35.04	Use professional tone and grammar in all correspondence (tickets, chat, email).
36.0		Apply critical thinking and problem-solving skills. The student will be able to:
	36.01	Use structured troubleshooting models (CompTIA A+ 6-step process) to diagnose issues.
	36.02	Collaborate with team members to resolve complex technical problems.
	36.03	Conduct research using technical documentation and vendor resources.
	36.04	Track and analyze patterns in recurring issues to develop preventive solutions.
37.0		Use information technology tools to enhance productivity and collaboration. The student will be able to:
	37.01	Utilize IT asset-management and ticketing systems to record and track incidents.
	37.02	Use office productivity applications (Google Workspace, Microsoft 365) for documentation and reporting.
	37.03	Leverage remote-support and collaboration tools (Teams, Zoom, Slack) to assist users and teams.
	37.04	Apply version-control and file-management best practices for shared projects.
38.0		Describe organizational roles and team dynamics in IT environments. The student will be able to:
	38.01	Explain the structure and function of IT departments within an organization.
	38.02	Describe cross-functional collaboration between help desk, network, and security teams.
	38.03	Discuss quality assurance and continuous improvement processes in IT support.
	38.04	Identify how global and cloud technologies impact modern IT operations.
39.0		Demonstrate professional ethics and legal responsibilities in IT support. The student will be able to:
	39.01	Apply ethical decision-making when handling confidential data and user information.

39.02	Recognize and comply with organizational policies and relevant laws (HIPAA, FERPA, GDPR).
39.03	Describe the long-term consequences of unethical or illegal behavior in technology fields.
39.04	Demonstrate responsible use of digital resources and adherence to acceptable-use policies.
Course Number: CTS0054 Occupational Completion Point – D Cloud Analyst – 150 Hours	
40.0	Evaluate and analyze cloud principles used in cloud computing. The student will be able to:
40.01	Describe the evolution of cloud computing.
40.02	Compare and contrast drivers and limitations of cloud computing.
40.03	Compare and contrast the four main deployment models for cloud computing, public, private, community, and hybrid.
40.04	Describe the three main service models for cloud computing (SaaS, PaaS, and IaaS).
40.05	Describe the role of the Internet and virtualization in cloud computing.
40.06	Identify managed services in cloud computing.
41.0	Identify the components of cloud-based services. The student will be able to:
41.01	Demonstrate proficiency in accessing web applications through web browser.
41.02	Describe, identify and use thin clients to complete business tasks.
41.03	Describe, identify and use thick clients to complete business tasks.
41.04	Describe, identify and use mobile clients to complete business tasks.
41.05	Explain application hosting.
41.06	Describe multipurpose architecture.
42.0	Evaluate cloud-based services. The student will be able to:
42.01	Perform calculations to identify the costs and savings of different cloud-based models for an organization.
42.02	Compare and contrast cloud-based services used in industry.
42.03	Identify the impacts to current and future staffing and operational needs.
42.04	Evaluate performance of cloud-based solutions using performance indicators.
43.0	Use cloud-based services. The student will be able to:
43.01	Compare and contrast outsourcing and cloud computing as alternatives for business.
43.02	Identify and use cloud-based services to improve productivity.
43.03	Describe the differences between capital expenditures (CapEx) and operational expenditures (OpEx).
43.04	Compare and contrast cloud-based services for consumer and business.
43.05	Use cloud-based services to perform collaboration online.
43.06	Compare and contrast the user experience in a cloud-based service and a traditional business model.
44.0	Evaluate and analyze techniques and methods of cloud deployment. The student will be able to:
44.01	Describe networking for cloud-based solutions.
44.02	Describe the role of automation and self-service in regard to cloud-based solutions.
44.03	Examine deployment and management of internal and external cloud services to complete business task.
44.04	Articulate the role of standardization in cloud-based solutions.
44.05	Express the impact of cloud systems on time to market.
44.06	Examine the distribution over the Internet in cloud deployment.
45.0	Evaluate the risks of cloud-based systems. The student will be able to:

45.01	Identify and evaluate compliance risks relating to software and vendors in cloud-based systems.
45.02	Describe user privacy rights and privacy risks in cloud-based systems.
45.03	Describe legal risks in cloud-based systems.
45.04	Explain the role of vendors and dependencies in cloud-based solutions.
45.05	Explain the risks of hardware independence.
45.06	Identify the main aspects of identity management.
46.0	Demonstrate an awareness of cloud implementation. The student will be able to:
46.01	Describe the use of a Virtual Private network access to Local Area Network.
46.02	Describe the risk of connecting a local cloud network to the public Internet.
46.03	Identify and describe the components of cloud environment.
46.04	Describe networking topologies in cloud environment.
46.05	Describe servers, switches, and routers in cloud-based architecture.
46.06	Explain the role of the datacenter in cloud-based architecture.
Course Number: CTS0056 Occupational Completion Point – E Cloud Virtualization Specialist – 300 Hours	
47.0	Demonstrate an understanding of virtualization concepts. The student will be able to:
47.01	Describe the role of the virtual CPU in virtualization.
47.02	Describe the role of virtual memory in virtual component.
47.03	Identify the process of system patching for virtual environment.
47.04	Describe virtual desktops.
47.05	Evaluate the components of networking topology including (servers, network, storage).
47.06	Compare and contrast traditional desktops and servers to virtual counterpart.
47.07	Analyze the hardware requirements to create and scale a virtual infrastructure.
47.08	Compare and contrast traditional virtualization and para-virtualization.
47.09	Identify, describe and use guest operating system in a virtualization environment.
47.10	Identify, define and use virtual machine monitor in virtual environment.
47.11	Perform virtual partitioning through the Hypervision.
47.12	Describe bare metal approach for virtualization portioning.
47.13	Describe hosted virtualization as a virtualization approach.
47.14	Apply industry standards for hardware support for virtualization.
47.15	Explain high-level language virtual machines.
47.16	Describe the benefits of server consolidation and containment acquired through migration to virtualization.
47.17	Describe the benefits of test and development optimization gained through virtualization.
47.18	Demonstrate how virtualization reduces cost and complexity of high availability and disaster recovery.
47.19	Demonstrate how virtualization can enhance security in the enterprise.
48.0	Install and configure the virtualization server platform. The student will be able to:
48.01	Compare and contrast virtual image to a golden image.
48.02	Create a virtual image using a virtualization platform using a base operating system.

48.03	Create a virtual template in which the golden image is configured with the software packages and application.
48.04	Configure the virtual template to ensure software settings and organizational policies are implemented.
48.05	Manage inventory objects licenses using the virtual infrastructure to comply with enterprise requirements.
48.06	Demonstrate how a virtual switch is used to create communication between virtual machines.
48.07	Perform communication between two virtual machines through the use of a virtual switch.
48.08	Create, manage and configure virtual switches to enable communication of virtual machines in different hosts.
48.09	Use virtual system management to remotely manage the allocation in a virtual network.
48.10	Perform and manage user roles and permission in a virtual environment.
48.11	Perform server patching on a virtual environment both on traditional servers as well virtual servers.
49.0	Install, configure and manage virtualized clients. The student will be able to:
49.01	Describe peripheral redirection.
49.02	Demonstrate proficiency in configuring virtual client to enable both USB and monitor redirection.
49.03	Compare and contrast the use of peripherals in a traditional and virtual environment.
49.04	Classify the types of virtual clients used in a virtualization infrastructure.
49.05	Demonstrate proficiency in performing tasks using thin, thick and mobile virtualization clients.
49.06	Compare and contrast the performance, ease of use and efficiency of different clients in completing business tasks.
49.07	Analyze business tasks that are better aligned to a particular virtualization client type.
49.08	Demonstrate proficiency in managing user sessions and policies of virtual clients.
50.0	Demonstrate proficiency in managing a virtualization infrastructure. The student will be able to:
50.01	Describe the process of cloning virtual machines.
50.02	Identify the benefits of cloning in a virtual infrastructure.
50.03	Compare and contrast full clones and linked clones.
50.04	Demonstrate proficiency in identifying situations in which cloning is a proper solution.
50.05	Demonstrate proficiency in deploying virtual machines using cloning.
50.06	Describe virtual migration and the situational needs that are required.
50.07	Identify the role of network bandwidth and resource allocation needed for virtual migration.
50.08	Describe automating migration to the host server.
50.09	Identify the process that migration affect virtual disk storage in particular SANs.
50.10	Demonstrate proficiency in developing action steps to execute a virtual migration.
51.0	Demonstrate an understanding of storage technologies and storage configuration. The student will be able to:
51.01	Describe the evolution of storage architecture and data center components.
51.02	Describe, identify and use data center elements host, connectivity and storage.
51.03	Identify describe and use RAID technology in an enterprise environment.
51.04	Identify the impact to application performance based on RAID implementation.
51.05	Describe an intelligent storage system.
51.06	Compare and contrast storage systems for a virtualization infrastructure.
51.07	Compare and contrast various storage network technologies. (e.g., Fibre Channel Storage Network FC SAN, IP SAN, Fibre Channel over Ethernet, Network Attached Storage, Object Based, Unified Storage)
51.08	Identify the appropriate storage network solutions based on client requirements.

	51.09	Demonstrate proficiency in creating and managing data stores.
	51.10	Demonstrate proficiency in configuring and managing resource pools.
52.0		Demonstrate proficiency in network optimization using network protocols, ports, and topologies. The student will be able to:
	52.01	Describe disaster recovery (business continuity) information availability for virtualized and non-virtualized environments.
	52.02	Demonstrate proficiency in backup and recovery in both virtualized and non-virtualized environments.
	52.03	Explain deduplication technology for backup optimization.
	52.04	Identify fixed content storage requirements and archival solutions.
	52.05	Describe continuous data replication and remote replication in virtualized and non-virtualized environments.
	52.06	Demonstrate proficiency in integrating Active Directory to a virtual environment.
	52.07	Demonstrate proficiency in CPU and memory optimization.
	52.08	Demonstrate proficiency using remote desktops and display protocols to optimize network infrastructure.
	52.09	Describe fault tolerance and acceptable levels tolerated based on the infrastructure.
53.0		Understand security in a virtualized environment. The student will be able to:
	53.01	Compare and contrast hosted and Bare-Metal virtualization implementations vulnerability to threats and attacks.
	53.02	Identify data leakage and malicious code intrusion.
	53.03	Demonstrate proficiency in securing data between guest and host environments.
	53.04	Demonstrate proficiency in managing resource allocation in a virtualized environment to reduce system crash.
	53.05	Demonstrate proficiency in creating images that are secure for client deployment.
	53.06	Identify software security levels and digital signatures.
	53.07	Demonstrate proficiency in using, configuring and managing host firewall in a virtualized infrastructure.
	53.08	Demonstrate proficiency in using command line to configure and manage the host firewall.
	53.09	Demonstrate proficiency in using logging tools to monitor activity in the virtual environment.
	53.10	Identify, describe and provide solutions to threats based on scalability and high availability.
	53.11	Demonstrate proficiency in securing mobile, thin and thick clients.
	53.12	Explain 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)

CTSOs are co-curricular 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. Other CTSOs not listed in this curriculum framework or recognized by the Florida Department of Education are permissible provided they support student mastery over the standards and benchmarks of this curriculum framework.

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 Communications (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.