Florida Department of Education
Curriculum Framework

Program Title: **Advanced Network Infrastructure**
Career Cluster: **Information Technology**

	CCC
CIP Number	0511100115
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 36 credit hours; Secondary: 28 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer System Administrators

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112)

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

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

Standards

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

01.0 Demonstrate an understanding of routing concepts.
02.0 Demonstrate an understanding of routing protocols.
03.0 Demonstrate router configuration skills.
04.0 Demonstrate an understanding of LAN design and concepts.
05.0 Demonstrate VLAN configuration skills.
06.0 Demonstrate an understanding of wide area networks (WAN).
07.0 Demonstrate Wide Area Network configuration skills.
08.0 Demonstrate an understanding of network security.
09.0 Demonstrate an understanding of remote access.
10.0 Demonstrate an understanding of IP addressing services.
11.0 Demonstrate an understanding of network maintenance, support and troubleshooting.

Florida Department of Education
Student Performance Standards

Program Title: **Advanced Network Infrastructure**
CIP Number: **0511100115**
Program Length: **Primary: 36 credit hours; Secondary: 28 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of routing concepts. – The student will be able to:
01.01	Describe the purpose, architecture, and operations of a router.
01.02	Identify the hardware and software components of routers.
01.03	Explain the purpose and nature of routing tables.
01.04	Describe administrative distance and routing metrics such as hop counts and cost.
01.05	Describe how a router determines a path and switches packets.
01.06	Differentiate between static and dynamic routing.
01.07	Explain the differences between class-full and classless routing.
01.08	Describe the use and operation of VLSM and CIDR.
01.09	Describe how a network converges.
02.0	Demonstrate an understanding of routing protocols. – The student will be able to:
02.01	Describe the characteristics of distance vector routing protocols.
02.02	Describe the characteristics of link state routing protocols.
02.03	Describe the differences between distance vector and link state routing protocols and determine the best routing protocol to use in a given situation.
02.04	Describe the features and operation of current internal and external routing protocols.
03.0	Demonstrate router configuration skills. – The student will be able to:
03.01	Configure and verify router interfaces.
03.02	Perform basic router configuration using the Command Line Interface (CLI) to inspect the operations of the router.
03.03	Design and implement a classless IP addressing scheme for a network.

	03.04	Configure a router for RIP version 2 operation.
	03.05	Use advanced configuration commands with routers.
	03.06	Configure a router for OSPF routing in a network.
	03.07	Fine-tune OSPF settings on a router, including the configuration of reference bandwidth, redistribution of static and default routes, and modification of OSPF intervals, in order to optimize network performance.
	03.08	Verify and troubleshoot router operations in an OSPF network.
	03.09	Configure and modify metric on a router to improve network performance.
	03.10	Configure summarization and default route settings on a router to optimize network performance.
	03.11	Verify and troubleshoot router operations in complex network environment.
04.0	Demonstrate an understanding of LAN design and concepts. – The student will be able to:	
	04.01	Identify the layers and functions of switched network architecture.
	04.02	Describe the principles and benefits of a hierarchical network design.
	04.03	Explain the technology and media access control method for Ethernet networks.
	04.04	Describe the issues associated with Layer 2.
	04.05	Describe the operation of a LAN switch.
	04.06	Describe the benefits of Virtual Local Area Networks (VLAN).
	04.07	Identify and describe the different VLAN encapsulation protocols and their operation.
	04.08	Describe the purpose and operation of VLAN Trunking Protocol (VTP) in the management of a switched network domain.
	04.09	Describe the purpose and operation of Spanning Tree Protocol (STP), and its variants.
	04.10	Describe the use of Inter-VLAN routing to connect different Networks in a switch-based network topology.
	04.11	Analyze business requirements and design a LAN structure to meet those requirements.
	04.12	Discuss quality-of-service considerations and switching prioritization.
05.0	Demonstrate VLAN configuration skills. – The student will be able to:	
	05.01	Perform and verify initial LAN switch configuration tasks including remote access management, switch port modes, and trunks.
	05.02	Configure, verify, and troubleshoot VLANs on a LAN switch.
	05.03	Implement a VLAN Domain by configuring LAN switches for VTP network operation.

	05.04	Configure a router to provide Inter-VLAN routing using multiple physical interfaces, and on a single physical interface with sub-interfaces.
	05.05	Configure and troubleshoot STP and its variants on a switched network environment.
	05.06	Configure and verify the bridge to optimize STP.
	05.07	Establish and configure port priorities.
	05.08	Troubleshoot and resolve issues with STP operations.
	05.09	Manage router and switch OS software.
06.0		Demonstrate an understanding of wide area networks (WAN). – The student will be able to:
	06.01	Describe WAN and MAN topologies.
	06.02	Differentiate between WAN and LAN topologies.
	06.03	Identify and describe WAN protocols.
	06.04	Describe the impact of applications (Voice Over IP, Video Over IP) on a network.
	06.05	Identify major network issues associated with the Internet, intranets and extranets.
	06.06	Explain the differences between the use of leased lines, packet-switched, and circuit-switched technologies.
	06.07	Describe typical WAN links and discuss bandwidth considerations.
	06.08	Identify and manage licensing.
07.0		Demonstrate Wide Area Network configuration skills. – The student will be able to:
	07.01	Configure and verify Point-to-Point WAN connection.
	07.02	Configure and verify a packet switched WAN connection.
	07.03	Configure and verify a basic WAN serial connection and PPP connection between routers.
	07.04	Configure and verify a PPP connection between routers.
	07.05	Troubleshoot WAN implementation issue.
	07.06	Implement LAN/WAN connections, including virtual private networks (VPN), tunneling.
08.0		Demonstrate an understanding of network security. – The student will be able to:
	08.01	Implement basic switch security measures such as port security, trunk access, and management VLANs.

	08.02	Identify current network security threats and explaining how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications.
	08.03	Describe the functions of common security appliances and applications.
	08.04	Implement recommended security practices to secure network devices.
	08.05	Discuss the functions of authentication servers.
	08.06	Describe the function and use of Access Control Lists (ACLs).
	08.07	Verify, monitor, and troubleshoot ACLs in a network environment.
09.0	Demonstrate an understanding of remote access. – The student will be able to:	
	09.01	Compare and contrast remote access protocols, wireless standards and network authentication methods.
	09.02	Configure static and dynamic routing and Network Address Translation (NAT).
	09.03	Configure remote access services, protocols and policies, conditions and settings.
	09.04	Describe Remote Access Dial-In User Service (RADIUS).
	09.05	Monitor and troubleshoot remote access.
10.0	Demonstrate an understanding of IP addressing services. – The student will be able to:	
	10.01	Describe the purpose and operation of DHCP and DNS in a networked environment.
	10.02	Configure, verify, and troubleshoot DHCP and DNS operation on a router.
	10.03	Describe the operation and use of NAT and Port Address Translation (PAT) to provide Internet access to Private IP Address networks.
	10.04	Configure, verify, and troubleshoot NAT on a router, including static translation, use of IP Address pools, and sharing a public IP address on a router interface.
	10.05	Describe the purpose and operation of IPv6.
	10.06	Configure, verify, and troubleshoot IPv6 routing in a network.
11.0	Demonstrate an understanding of network maintenance, support and troubleshooting. – The student will be able to:	
	11.01	Identify, interpret and maintain network documentation, procedures and practices.
	11.02	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
	11.03	Follow standard operating procedures for troubleshooting hardware and software.
	11.04	Manage, maintain and backup router and switch system and configuration files.

11.05	Recognize and resolve hardware and software configuration problems.
11.06	Identify and resolve common network problems at Layers 1, 2, 3, and 7 using a layered model approach. Describe the use and features of diagnostic test equipment.
11.07	Determine type of programs and procedures required to: baseline network performance, identify intrusion and unacceptable system use, identify performance issues, predict system failures, and optimize network availability.
11.08	Use network monitoring and management tools effectively to integrate and manage network resources.
11.09	Explain SNMP and its use in monitoring a network.
11.10	Configure network devices to send SNMP traps or alerts to network management systems.
11.11	Establish and document a network baseline.
11.12	Compare and analyze initial performance measurements with the availability of critical network devices and connections to determine the difference between abnormal behavior and proper network performance as the network grows or traffic patterns change.
11.13	Describe optimization of traffic flow conditions on network connections based on analysis of traffic types, characteristics and user needs.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Network Virtualization**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100116
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 24 credit hours; Secondary: 18 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

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

Standards

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

01.0 Demonstrate an understanding of virtualization concepts.
02.0 Install and configure the virtualization server platform.
03.0 Install, configure and manage virtualized clients.

Florida Department of Education
Student Performance Standards

Program Title: **Network Virtualization**
CIP Number: **0511100116**
Program Length: **Primary: 18 credit hours; Secondary: 24 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (15111001112). At the completion of this program, the student will be able to:
01.0 Demonstrate an understanding of virtualization concepts. – The student will be able to:
01.01 Describe the purpose, uses and software features of computer virtualization.
01.02 Identify and describe virtualization products, applications and services.
01.03 Identify compatibility issues among hardware and software products.
01.04 Identify the elements necessary for a Virtual Desktop Infrastructure.
01.05 Explain the benefits and considerations for virtual storage, including local host disk, iSCSI SAN, Fibre Channel SAN, and NFS SAN.
01.06 Explain storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
01.07 Describe backup, recovery, disaster recovery, business continuity, and replication concepts.
01.08 Describe the policies and profile management which restrict and allow features.
01.09 Identify and modify desktop catalogs, groups, and a master virtual machine.
02.0 Install and configure the virtualization server platform. – The student will be able to:
02.01 Install and configure the virtualization platform.
02.02 Install and configure the virtualization environment to create a new farm or join an existing farm.
02.03 Automate virtual machine and cluster deployment.
02.04 Monitor and maintain license usage requirements and trends.
02.05 Manage virtualization networking and storage.
02.06 Manage user sessions from the administrative console.

	02.07 Configure network connectivity and storage for the virtualization software.
03.0	Install, configure and manage virtualized clients. – The student will be able to:
	03.01 Identify requirements for virtual machines according to task.
	03.02 Configure the virtual environment and the virtual machine properties.
	03.03 Install, configure and manage a virtual machine desktop client.
	03.04 Install, configure and manage a virtualized server.
	03.05 Manually deploy and migrate virtual machines.
	03.06 Configure and assign users to pooled virtual desktops and dedicated virtual desktops.
	03.07 Convert physical machines to virtual machines.
	03.08 Configure desktop resources for access by users.
	03.09 Configure and monitor back up virtual machine data to shared storage.
	03.10 Migrate, convert, and monitor virtual machines.
	03.11 Create and update shared disks.

Additional Information

Laboratory Activities

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

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Florida Department of Education
Curriculum Framework

Program Title: **Advanced Network Virtualization**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100117
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 34 credit hours; Secondary: 27 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

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

Standards

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

01.0 Demonstrate proficiency in basic computer maintenance and support.
02.0 Demonstrate an understanding of common operating system concepts and associated practices.
03.0 Demonstrate an understanding of virtualization concepts.
04.0 Install and configure the virtualization server platform.
05.0 Install, configure and manage virtualized clients.
06.0 Install, configure, and maintain a virtualized application.
07.0 Demonstrate proficiency in managing a virtualization infrastructure.

Florida Department of Education
Student Performance Standards

Program Title: **Advanced Network Virtualization**
CIP Number: **0511100117**
Program Length: **Primary: 34 credit hours; Secondary: 27 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic computer maintenance and support. – The student will be able to:
01.01	Describe the main computer components and their functions.
01.02	Describe the operation of computer systems, including input and output systems, file systems, device management, program loading and execution and data storage.
01.03	Describe and identify the safe and ethical use of computers.
01.04	Describe and identify proficiency in connecting to and safely using the Internet.
01.05	Describe emerging computer technologies and discuss their potential impact.
01.06	Implement proper procedures for handling and safeguarding equipment.
01.07	Describe procedures for proper disposal of computer components.
01.08	Install, configure, maintain and secure computer systems and peripherals following institutional protocol.
01.09	Configure and update firmware and ROM-BIOS.
01.10	Implement work order procedures.
01.11	Design and implement systems redundancy and data backups.
01.12	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
01.13	List the steps in problem solving.
01.14	Recognize and resolve basic computer configuration problems.
02.0	Demonstrate an understanding of common operating system concepts and associated practices. – The student will be able to:
02.01	Describe the components and functions of major operating systems.
02.02	Compare and contrast major functions and features of current network operating systems (including directory services).
02.03	Install, configure and update client and server operating systems.

02.04	Describe the purpose and uses of computer virtualization.
02.05	Manage device drivers and software for peripheral devices.
02.06	Manage the network and firewall settings of a client.
02.07	Use an operating system for activities such as data and file management.
02.08	Identify current systems utilities and describe their functions.
02.09	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
02.10	Create, use, maintain, backup and restore system configuration files.
02.11	Describe procedures for uninstalling operating system software.
02.12	Install and configure client software for connecting to LANs, WANs, and the Internet.
02.13	Demonstrate knowledge of basic troubleshooting methodology.
03.0	Demonstrate an understanding of virtualization concepts. – The student will be able to:
03.01	Describe the purpose, uses and software features of computer virtualization.
03.02	Identify and describe virtualization products, applications and services.
03.03	Identify compatibility issues among hardware and software products.
03.04	Identify the elements necessary for a Virtual Desktop Infrastructure.
03.05	Explain the benefits and considerations for virtual storage, including local host disk, iSCSI SAN, Fibre Channel SAN, and NFS SAN.
03.06	Explain storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
03.07	Describe backup, recovery, disaster recovery, business continuity, and replication concepts.
03.08	Describe the policies and profile management which restrict and allow features.
03.09	Identify and modify desktop catalogs, groups, and a master virtual machine.
04.0	Install and configure the virtualization server platform. – The student will be able to:
04.01	Install and configure the virtualization platform.
04.02	Install and configure the virtualization environment to create a new farm or join an existing farm.
04.03	Automate virtual machine and cluster deployment.
04.04	Monitor and maintain license usage requirements and trends.

	04.05 Manage virtualization networking and storage.
	04.06 Manage user sessions from the administrative console.
	04.07 Configure network connectivity and storage for the virtualization software.
05.0	Install, configure and manage virtualized clients. – The student will be able to:
	05.01 Identify requirements for virtual machines according to task.
	05.02 Configure the virtual environment and the virtual machine properties.
	05.03 Install, configure and manage a virtual machine desktop client.
	05.04 Install, configure and manage a virtualized server.
	05.05 Manually deploy and migrate virtual machines.
	05.06 Configure and assign users to pooled virtual desktops and dedicated virtual desktops.
	05.07 Convert physical machines to virtual machines.
	05.08 Configure desktop resources for access by users.
	05.09 Configure and monitor back up virtual machine data to shared storage.
	05.10 Migrate, convert, and monitor virtual machines.
	05.11 Create and update shared disks.
06.0	Install, configure, and maintain a virtualized application. – The student will be able to:
	06.01 Install and configure a virtualized application.
	06.02 Configure virtualization applications to use a proxy.
	06.03 Configure virtualized application resources for access by users.
	06.04 Install and use profiling software on a virtualized application for streaming, and linking dependent profiles to allow interaction between streamed applications.
	06.05 Monitor virtualization applications and implementing policies.
	06.06 Migrate, convert, and monitor virtual appliances.
	06.07 Test policies to verify the achievement of the desired effect.
	06.08 Configure and deliver a plug-in package, and verifying that self-service applications can be added from a client device.

06.09	Install and configure provisioning services.
06.10	Optimize a provisioning services server.
06.11	Describe end user optimization techniques.
07.0	Demonstrate proficiency in managing a virtualization infrastructure. – The student will be able to:
07.01	Manage user access to virtualized applications and machines in the virtualization infrastructure.
07.02	Manage the infrastructure to provide high availability and data access.
07.03	Describe administration of the virtualization environment.
07.04	Describe tools that can be used to monitor virtualization application servers and sessions.
07.05	Manage and maintain network infrastructure and storage resources.
07.06	Create and apply worker groups.
07.07	Configure and optimize load management.
07.08	Configure a resource pool for optimal performance.
07.09	Troubleshoot infrastructure problems and virtual environment issues.
07.10	Resolve application compatibility issues.

Additional Information

Laboratory Activities

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

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Florida Department of Education
Curriculum Framework

Program Title: **Network Security**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100118
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 30 credit hours; Secondary: 20 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

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

Standards

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

01.0 Demonstrate proficiency in securing network infrastructures and protecting data.
02.0 Demonstrate proficiency in performing security penetration testing.
03.0 Demonstrate proficiency in responding to cybersecurity incidents.
04.0 Demonstrate proficiency in the essential elements of forensic analysis.
05.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: Network Security
CIP Number: 0511100118
Program Length: Primary: 30 credit hours; Secondary: 20 credit hours
SOC Code(s): 15-1122

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in securing network infrastructures and protecting data. – The student will be able to:
01.01	Explain the major categories of computer crimes and attacks.
01.02	Identify vulnerabilities inherent in network devices, protocols and services.
01.03	Develop institutional security policies and practices in compliance with relevant governmental standards and regulations.
01.04	Implement protective measures in securing critical information assets.
01.05	Deploy various network security related equipment including, firewalls, intrusion prevention systems, and proxies.
01.06	Secure critical network services such as Directory Services, Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), and File Transfer Protocol (FTP).
01.07	Secure desktop client operating systems against viruses, malware and other malicious attacks.
01.08	Detect malicious and abnormal activities through logs, intrusion detection systems and other utilities and appliances.
02.0	Demonstrate proficiency in performing security penetration testing. – The student will be able to:
02.01	Identify organizational compliance with regulatory and legislative Information Assurance (IA) requirements.
02.02	Identify physical and logical weaknesses in computers and networks as well as physical weaknesses and weaknesses in policies, procedures and practices relating to the network and the organization.
02.03	Test the network perimeter defense mechanisms to ensure boundaries.
02.04	Simulate methods that intruders use to gain unauthorized access to an organization’s networked systems and attempted to compromise them.
02.05	Deploy proprietary and/or open source tools to test known technical vulnerabilities in networked systems.
02.06	Determine which vulnerabilities are exploitable and the degree of information exposure or network control that the organization could expect an attacker to achieve after successfully exploiting vulnerability.
02.07	Recommend procedures to mitigate against discovered vulnerabilities and security gaps.

	02.08 Prepare penetration testing deliverables including reports, documentations.
	02.09 Describe the ethics of a licensed Penetration Tester.
03.0	Demonstrate proficiency in responding to cybersecurity incidents. – The student will be able to:
	03.01 Explain contingency planning and its components.
	03.02 Collect data from logs and other resources to aid in detecting security incidents.
	03.03 Assemble an incidence response plan.
	03.04 Recover from incidents by restoring services and processes.
	03.05 Manage evidentiary data in an electronic environment.
04.0	Demonstrate proficiency in the essential elements of forensic analysis. – The student will be able to:
	04.01 Describe the four phases of forensic analysis and discuss the activities performed in each phase.
	04.02 Describe the forensic and evidentiary considerations when determining containment.
	04.03 Describe the types and sources of data collected for forensic analysis.
	04.04 Explain the various forms of data and associated collection/retrieval tools for the application transport, IP, and link layers.
	04.05 Explain the processes by which data is collected for analysis.
	04.06 Describe the role of system event logs in data collection.
	04.07 Describe the role of the process log in data collection.
	04.08 Describe the processes associated with preserving evidence collected for forensic purposes.
	04.09 Describe how the chain of custody can be maintained for evidence collected during a forensic analysis effort.
05.0	Demonstrate employability skills. – The student will be able to:
	05.01 Conduct a job search.
	05.02 Secure information about a job.
	05.03 Identify documents that may be required when applying for a job.
	05.04 Complete a job application form correctly.
	05.05 Demonstrate competence in job interview techniques.
	05.06 Demonstrate knowledge of how to make appropriate decisions.
	05.07 Demonstrate appropriate work/behavioral habits.

05.08 Demonstrate acceptable employee personal hygiene and health.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Digital Forensics**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100119
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 32 credit hours; Secondary: 24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

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

Standards

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

01.0 Demonstrate proficiency in basic and advanced security concepts.
02.0 Demonstrate proficiency in managing hardware involved in imaging and data collection activities.
03.0 Demonstrate proficiency in analyzing common file systems.
04.0 Demonstrate proficiency in performing computer forensics investigations.
05.0 Demonstrate proficiency in performing mobile device forensics.
06.0 Demonstrate proficiency in incident handling and response.
07.0 Identify key pieces of legislation and processes related to digital forensics.
08.0 Demonstrate an understanding of the tasks related to the casework process.

Florida Department of Education
Student Performance Standards

Program Title: **Digital Forensics**
CIP Number: **0511100119**
Program Length: **Primary: 32 credit hours; Secondary: 24 credit hours**
SOC Code(s): **15-1122**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic and advanced security concepts. – The student will be able to:
01.01	Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications.
01.02	Describe the basic categories of vulnerabilities associated with cybersecurity (i.e., hardware, software, network, human, physical, organizational).
01.03	Describe the role of digital certificates and their role in IT security.
01.04	Describe network-based IDS, its capabilities, and its approaches to detection (i.e., anomaly, signature).
01.05	Describe the use of firewalls and other means of intrusion prevention.
01.06	Describe security design principles and their role in limiting points of vulnerability.
01.07	Discuss authentication methods and strategies.
01.08	Describe the processes involved in hardening a computer system or network.
01.09	Compare and contrast the forms, limitations, and vulnerabilities associated with centralized and decentralized key management schemas, including the PKI web of trust model.
01.10	Evaluate an existing security posture and identify gaps and vulnerabilities in security.
01.11	Describe the types of penetration tests (i.e., human, physical, wireless, data networks, telecommunications), the goals of each type, the metrics tested, and the value of their results.
01.12	Compare and contrast the processes of black box versus white box penetration testing, including their characteristics, limitations, and appropriateness.
01.13	Describe common testing methodologies and standards used in penetration testing.
01.14	Demonstrate proficiency in basic forensic concepts.
01.15	Describe the range of testing/evaluation and associated tools used to monitor mitigation control effectiveness.

01.16	Create a risk management framework.
01.17	Describe the purpose and scope of an Information Systems Contingency Plan (ISCP).
01.18	Identify the five main components of a contingency plan (i.e., Supporting Information, Activation and Notification, Recovery, Reconstitution, and Appendices).
01.19	Describe the purpose and scope of an IT security disaster recovery plan.
01.20	Describe the purpose and scope of an IT security business continuity plan.
01.21	Describe the four phases of forensic analysis and discuss the activities performed in each phase.
01.22	Describe the forensic and evidentiary considerations when determining containment.
01.23	Describe the types and sources of data collected for forensic analysis.
01.24	Explain the various forms of data and associated collection/retrieval tools for the application transport, IP, and link layers.
01.25	Describe the essential elements of forensic analysis.
02.0	Demonstrate proficiency in managing hardware involved in imaging and data collection activities. – The student will be able to:
02.01	Discuss the different types of Motherboard Connections.
02.02	Explain the components that comprise a Motherboard and their functions.
02.03	Describe the different types of permanent storage.
02.04	Compare and contrast the different host interface standards.
02.05	Describe how Solid State storage processes differ from traditional storage.
02.06	Discuss the different types of removable media and their impacts on data collection.
02.07	Explain the concepts of RAID including the different Levels and their impacts on the imaging and collection process.
02.08	Compare and contrast the read/write process of both permanent and temporary storage devices.
02.09	Compare the standard boot process to the Forensic/controlled boot process.
03.0	Demonstrate proficiency in analyzing common file systems. – The student will be able to:
03.01	Define the Master Boot Record (MBR) and discuss its purpose and any important items that it may contain.
03.02	Explain the purpose of the Boot Parameter Block (BPB) and its components.

	03.03 Discuss the different File Systems available in an OS environment. Identify the strengths and weaknesses of each system.
	03.04 Explain the process of file creation and deletion in an OS environment including the concept of file artifacts.
	03.05 Discuss the formatting process in an OS environment.
	03.06 Explain pertinent OS system files related to data storage and their functions.
	03.07 Discuss how Windows handles the concept of Date and Time in relation to file management and how it differs from UNIX-like operating systems.
	03.08 Define the different file systems that can be used with removable media.
	03.09 Explain the concepts of Open and Closed sessions.
04.0	Demonstrate proficiency in performing computer forensics investigations. – The student will be able to:
	04.01 Create security incident handling and response policies.
	04.02 Recover deleted, encrypted, or damaged file information as evidence for civil or criminal cases.
	04.03 Deploy proprietary and/or open source tools to identify an intruder's footprints.
	04.04 Coordinate incident response activities in cooperation with law enforcement agencies.
	04.05 Prepare proper documentations of chain of custody, accounting for where each evidence item originated from, where it is going, and what entity has possession of the evidence.
	04.06 Preserve forensic integrity of evidence so they can be admissible in court.
	04.07 Describe moral and ethical standards in conducting digital forensics investigations.
05.0	Demonstrate proficiency in performing mobile device forensics. – The student will be able to:
	05.01 Preserve, acquire, and examine data stored on mobile devices.
	05.02 Perform forensic acquisition and examination of SIM cards.
	05.03 Apply forensic principles and tools to mobile and IoT devices.
	05.04 Demonstrate proficiency in using open-source and proprietary mobile device forensics tools.
	05.05 Compare forensic acquisition tools and validate the completeness and accuracy of results.
	05.06 Describe forensic acquisition and examination of GPS navigation devices.
	05.07 Utilize the results from mobile device forensics for internal investigations or in civic/criminal litigation.

06.0	Demonstrate proficiency in incident handling and response. – The student will be able to:
06.01	Design an incident response plan including: assessment, communication, containment, evaluation, recovery, and documentation.
06.02	Describe information-hiding techniques.
06.03	Describe the steps required to collect, seize, and protect evidence.
06.04	Recover data from various storage devices after physical and/or logical damage.
06.05	Search and report on memory in real time with live and system forensics.
06.06	Investigate network traffic using log files, time analysis, sniffers, and other traffic analysis tools.
06.07	Explain the legal considerations to investigating emails as prescribed in the Electronic Communications Privacy Act.
06.08	Identify email tracing techniques in forensic investigations.
07.0	Identify key pieces of legislation and processes related to digital forensics. – The student will be able to:
07.01	Describe the importance of creating an accurate representation of the facts.
07.02	Explain the components of the Discovery Process.
07.03	Discuss the 4th Amendment and its impact on the digital forensics investigative process.
07.04	Identify laws and court cases related to computer forensics and their impacts on the investigation process.
07.05	Identify and explain the basic Federal Rules of Evidence.
07.06	Compare and contrast the different qualifications required to be a licensed computer forensics professional from state to state.
07.07	Define the concept of a subpoena and explain the process of how one is obtained.
07.08	Explain the steps required to acquire a search warrant.
07.09	Discuss the concept of consent and the ways that it can be granted.
07.10	Compare the legal process for civil and criminal cases.
07.11	Define the concept of expert testimony and the process involved in being classified as an expert.
07.12	Discuss appropriate courtroom behavior.

08.0	Demonstrate an understanding of the tasks related to the casework process. – The student will be able to:
	08.01 Explain the steps involved in maintaining the integrity of digital evidence.
	08.02 Discuss the process of creating a forensics image.
	08.03 Define hashing and explain its uses in ensuring image authenticity.
	08.04 Describe sector slack space and its potential impact on evidence gathering.
	08.05 Describe the importance of documenting the examination process.
	08.06 Explain control/security access logs for images and their importance in maintaining evidence.
	08.07 Describe the steps involved in preparing evidence and documents for trial.
	08.08 Explain the procedures involved in creating a digital forensics investigation report including examples of report formats.
	08.09 Discuss the importance of the Summation and Analysis sections of the digital investigation report.

Additional Information

Laboratory Activities

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

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Accommodations

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Florida Department of Education
Curriculum Framework

Program Title: **IP Communications**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100120
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 32 credit hours; Secondary: 21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

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

Standards

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

01.0 Demonstrate an understanding of IP Communication theory.
02.0 Demonstrate an understanding of digitizing voice traffic and voice compression standards.
03.0 Demonstrate an understanding of Quality of Service (QoS) requirements in a converged data and voice network.
04.0 Demonstrate an understanding of IP communications design.
05.0 Demonstrate an understanding of troubleshooting procedures for IP communications.
06.0 Demonstrate an understanding of utilizing advanced Voice over IP (VoIP) and Data Bundle solutions to provide a single network connection for phone services and high-speed Internet.
07.0 Demonstrate an understanding of using Statistical Analysis System *(*SAS) sessions to exchange data by using the TCP/IP communications access method.
08.0 Demonstrate how to configure VoIP fax applications for universal access servers.
09.0 Demonstrate an understanding of key concepts for Video over IP.

Florida Department of Education
Student Performance Standards

Program Title: **IP Communications**
CIP Number: **0511100120**
Program Length: **Primary: 32 credit hours; Secondary: 21 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (0511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of IP Communication theory. – The student will be able to:
01.01	Describe the supported multivendor hardware platforms for VoIP technology, their limits, and their boundaries.
01.02	Describe how Voice Gateways function in an IP Telephony (IPT) solution.
01.03	Identify and describe the Local Area Network (LAN) switching products useable in an IPT solution.
02.0	Demonstrate an understanding of digitizing voice traffic and voice compression standards. – The student will be able to:
02.01	Identify the steps required for analog to digital conversion in a VoIP network.
02.02	Identify the signaling steps required to complete a Public Switched Telephone Network (PSTN) call.
02.03	Define the function of Private Branch eXchanges (PBX) or key systems.
02.04	Configure Foreign eXchange Subscriber (FXS) and Foreign eXchange Office (FXO) interfaces on a Voice Gateway.
03.0	Demonstrate an understanding of Quality of Service (QoS) requirements in a converged data and voice network. – The student will be able to:
03.01	Identify the steps required to minimize jitter, packet loss and serialization delay in a VoIP network.
03.02	Explain the function of IP precedence and different Class of Service (CoS) types.
03.03	Identify and list the types of traffic coming into the interface and defining their relative priority.
03.04	Configure a priority or custom queuing list.

04.0	Demonstrate an understanding of IP communications design. – The student will be able to:
	04.01 Identify the most appropriate gateway in IP communication design.
	04.02 Identify and describe dial plan architecture in IP communication design.
	04.03 Identify the correct route patterns, filters, and use of wild cards in VoIP design scenarios.
	04.04 List available classes of services in IP communication design and their constraints.
	04.05 Describe how to use digit manipulation in VoIP design.
	04.06 Identify the appropriate QoS tools needed for the proper operation of voice traffic on a network.
05.0	Demonstrate an understanding of troubleshooting procedures for IP communications. – The student will be able to:
	05.01 Identify the appropriate method for providing redundancy in VoIP design.
	05.02 Describe the tools used in troubleshooting IP communication networks.
	05.03 Identify and describe the different call flows and series of events through the call traces and debug outputs when troubleshooting.
	05.04 List the alarms used in IP communication troubleshooting.
06.0	Demonstrate an understanding of utilizing advanced Voice over IP (VoIP) and Data Bundle solutions to provide a single network connection for phone services and high-speed Internet. – The student will be able to:
	06.01 Identify the required bandwidth speeds needed for uninterrupted service and fast uploads and downloads.
	06.02 Describe the impact of voice samples, codecs, and packet size on bandwidth.
	06.03 Describe on demand use of voice/data and voice prioritization, delivered over a private/secure line.
	06.04 Describe features for a VoIP and data bundle.
	06.05 Describe VoIP and data bundle used to dynamically alternate between voice and Internet as call volume needs dictate.
07.0	Demonstrate an understanding of using Statistical Analysis System (SAS) sessions to exchange data by using the TCP/IP communications access method. – The student will be able to:
	07.01 Identify that a SAS/SHARE server ID has been added to the TCP/IP SERVICES file.
	07.02 Describe how to invoke SAS sessions utilizing TCP/IP communications access method.
	07.03 Describe syntax used to identify port numbers, defined in the client TCP/IP SERVICES file.

08.0	Demonstrate how to configure VoIP fax applications for universal access servers. – The student will be able to:	
	08.01	Describe fax applications that enable universal access servers to send and receive faxes across packet-based networks using modems.
	08.02	Describe universal inbox applications for fax and e-mail and how faxes and e-mails can go to the same mailbox using direct inward dialing.
	08.03	Describe how to broadcast a fax to multiple recipients simultaneously.
09.0	Demonstrate an understanding of key concepts for Video over IP. – The student will be able to:	
	09.01	Describe video over IP systems using existing standards to reduce the data to a bitstream and then an IP network to carry the encapsulated data in a stream of IP packets.
	09.02	Describe the quality of service requirements which must be fulfilled for use in broadcast carrying video over IP networks.
	09.03	Describe bandwidth requirements, the maximum allowable packet loss rate, and approaches to achieve acceptable bandwidth such as quantity of service, network admission control, bandwidth reservation, traffic shaping, and traffic prioritization techniques.
	09.04	Describe latency variation and its effect on making synchronization more complex by making the recovery of the underlying timing of the video signal far more difficult.

Additional Information

Laboratory Activities

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

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Florida Department of Education
Curriculum Framework

Program Title: **Network Support Technician**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100121
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 21 credit hours; Secondary: 16 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1152 – Computer Network Support Specialists

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

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

Standards

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

01.0 Demonstrate proficiency in basic computer network maintenance and support.
02.0 Demonstrate a fundamental understanding of computer networking.
03.0 Demonstrate an understanding of common operating system concepts and associated practices.
04.0 Demonstrate fundamental proficiency in network security essentials.

Florida Department of Education
Student Performance Standards

Program Title: Network Support Technician
CIP Number: 0511100121
Program Length: Primary: 21 credit hours; Secondary: 16 credit hours
SOC Code(s): 15-1152

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Demonstrate proficiency in basic computer network maintenance and support. – The student will be able to:
01.01	Describe the main computer components and their functions.
01.02	Describe the operation of computer systems, including input and output systems, file systems, device management, program loading and execution and data storage.
01.03	Describe and identify the safe and ethical use of computers.
01.04	Describe and identify proficiency in connecting to and safely using the Internet.
01.05	Describe emerging computer technologies and discuss their potential impact.
01.06	Implement proper procedures for handling and safeguarding equipment.
01.07	Describe procedures for proper disposal of computer components.
01.08	Install, configure, maintain and secure computer systems and peripherals following institutional protocol.
01.09	Configure and update firmware and ROM-BIOS.
01.10	Implement work order procedures.
01.11	Design and implement systems redundancy and data backups.
01.12	Describe effective troubleshooting strategies and techniques to resolve basic hardware, software, and network problems.
01.13	List the steps in problem solving.
01.14	Recognize and resolve basic computer configuration problems.

01.15	Examine and identify the parts of the Windows Registry.
02.0	Demonstrate a fundamental understanding of computer networking. – The student will be able to:
02.01	Explain the use of binary numbers and perform related binary and hexadecimal arithmetic.
02.02	Describe current network environments.
02.03	Describe network communications and architecture.
02.04	Identify network components, media, connectors, applications and protocols.
02.05	Compare and contrast the OSI and TCP/IP reference models and their layers.
02.06	Identify and describe current relevant IEEE network standards.
02.07	Create an IP addressing scheme using Variable Length Subnet Masks (VLSM) and Classless Inter-Domain Routing (CIDR).
02.08	Identify and discuss issues related to networked environments, such as security, access control, fair use, privacy and redundancy.
02.09	Identify and discuss issues related to naming conventions for user IDs, email, passwords, and network hosts and devices.
02.10	Identify standard network topologies and describe the advantages and disadvantages of each topology.
02.11	Describe the major functions of LAN protocols.
02.12	Explain the functions of wireless components, standards, hardware, software, and infrastructure design.
02.13	Configure and manage the TCP/IP protocol stack.
02.14	Describe how TCP and UDP Port addresses, IP addresses, and MAC addresses function, and how they are used to deliver data across the network.
02.15	Identify emerging technologies and discuss related technical issues.
02.16	Design a local area network (LAN), including the specification of architecture, hardware and software.
02.17	Identify the advantages and use of virtual local area networks (VLANs).
02.18	Identify and explain wide area network (WAN) concepts.
02.19	Plan, configure and test a small network and establish baselines.
02.20	Describe the major functions of network server software components.

02.21	Install applications on a server and configure clients for network access.
03.0	Demonstrate an understanding of common operating system concepts and associated practices. – The student will be able to:
03.01	Describe the components and functions of major operating systems.
03.02	Compare and contrast major functions and features of current network operating systems (including directory services).
03.03	Install, configure and update client and server operating systems.
03.04	Describe the purpose and uses of computer virtualization.
03.05	Manage device drivers and software for peripheral devices.
03.06	Manage the network and firewall settings of a client.
03.07	Use an operating system for activities such as data and file management.
03.08	Identify current systems utilities and describe their functions.
03.09	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.10	Create, use, maintain, backup and restore system configuration files.
03.11	Describe procedures for uninstalling operating system software.
03.12	Install and configure client software for connecting to LANs, WANs, and the Internet.
03.13	Demonstrate knowledge of basic troubleshooting methodology.
04.0	Demonstrate fundamental proficiency in network security essentials. – The student will be able to:
04.01	Describe common security threats to, and vulnerabilities of, computer systems and the corresponding best practices for mitigation.
04.02	Define and describe malicious software and techniques to protect systems from its effects.
04.03	Describe Denial of Service attacks and means to defend against them.
04.04	Identify the risks and techniques of data loss and its prevention.
04.05	Describe the principles and techniques of securing data storage and transmission.
04.06	Identify current encryption and authentication standards.
04.07	Describe security policies, including compliance and operational security.
04.08	Configure access control, identity management and security logging.

04.09	Describe client and network system security software and related updates.
04.10	Describe the functions and characteristics of firewalls.
04.11	Perform a ping sweep to identify network hosts.
04.12	Perform a port scan to probe network hosts for open TCP and UDP ports.
04.13	Describe the purpose and operation of network protocol analyzers.
04.14	Utilize a network protocol analyzer to capture and analyze network traffic for security issues.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Linux System Administrator**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100122
Program Type	College Credit Certificate (CCC)
Program Length	Primary: 24 credit hours; Secondary: 21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators

Purpose

This certificate program is part of the Network Systems Technology AS degree program (1511100112).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

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

Standards

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

01.0 Understand and use essential tools.
02.0 Operate running systems.
03.0 Configure local storage.
04.0 Create and configure file systems.
05.0 Deploy, configure, and maintain systems.
06.0 Manage users and groups.
07.0 Manage security.

Florida Department of Education
Student Performance Standards

Program Title: **Linux System Administrator**
CIP Number: **0511100122**
Program Length: **Primary: 24 credit hours; Secondary: 21 credit hours**
SOC Code(s): **15-1142**

This certificate program is part of the Network Systems Technology AS degree program (1511100112). At the completion of this program, the student will be able to:	
01.0	Understand and use essential tools. – The student will be able to:
01.01	Access a shell prompt and issue commands with correct syntax.
01.02	Use input-output redirection (>, >>, |, 2>, etc.). Demonstrate the use of standard-in, standard-out, standard-error, and pipe.
01.03	Demonstrate the use of grep and regular expressions to analyze text.
01.04	Access remote systems using SSH.
01.05	Log in and switch users in multiuser targets.
01.06	Archive, compress, unpack, and uncompress files using a variety of tools.
01.07	Create and edit text files.
01.08	Create, delete, copy, and move files and directories.
01.09	Create hard and soft links.
01.10	List, set, and change standard ugo/rwx permissions.
01.11	Locate, read, and use system documentation including man, info, and files in /usr/share/doc.
02.0	Operate running systems. – The student will be able to:
02.01	Boot, reboot, and shut down a system normally.
02.02	Boot systems into different targets manually.
02.03	Interrupt the boot process in order to gain access to a system.
02.04	Identify CPU/memory intensive processes, adjust process priority with renice, and kill processes.

	02.05 Locate and interpret system log files and journals.
	02.06 Perform various logging related activities such as configuring logging, log rotation and log reporting.
	02.07 Access a virtual machine's console.
	02.08 Explain the meaning and use of common metrics such as utilization values for CPU, memory, disk space, disk I/O, and network bandwidth.
	02.09 Start and stop virtual machines.
	02.10 Start, stop, and check the status of network services.
	02.11 Securely transfer files between systems.
03.0	Configure local storage. – The student will be able to:
	03.01 List, create,and delete partitions on MBR and GPT disks.
	03.02 Create and remove physical volumes, assign physical volumes to volume groups, and create and delete logical volumes.
	03.03 Configure systems to mount file systems at boot by Universally Unique ID (UUID) or label.
	03.04 Create, use and remove snapshots of logical volumes.
	03.05 Add new partitions and logical volumes, and swap to a system non-destructively.
04.0	Create and configure file systems. – The student will be able to:
	04.01 Create, mount, unmount, and using various file systems.
	04.02 Mount and unmount CIFS and NFS network file systems.
	04.03 Extend existing logical volumes.
	04.04 Discuss set UID and GID.
	04.05 Create and manage Access Control Lists (ACLs).
	04.06 Diagnose and correct file permission problems.
05.0	Deploy, configure, and maintain systems. – The student will be able to:
	05.01 Configure networking and hostname resolution statically or dynamically.
	05.02 Schedule tasks using at and cron.
	05.03 Start and stop services and configure services to start automatically at boot.

05.04	Configure systems to boot into a specific target automatically.
05.05	Perform an unattended system install.
05.06	Configure a physical machine to host virtual guests.
05.07	Install Linux systems as virtual guests.
05.08	Configure systems to launch virtual machines at boot.
05.09	Configure network services to start automatically at boot.
05.10	Configure a system to use time services.
05.11	Install and update software packages from a remote repository or a local file system.
05.12	Update the kernel package appropriately to ensure a bootable system.
05.13	Modify the system bootloader.
06.0	Manage users and groups. – The student will be able to:
06.01	Create, delete, and modify local and global user accounts.
06.02	Change passwords and adjust password aging for local and global user accounts.
06.03	Create, delete, and modify local and global groups and group memberships.
06.04	Configure a system to use an existing authentication service for user and group information.
07.0	Manage security. – The student will be able to:
07.01	Describe security basic concepts and mechanisms, including encryption, password safety, message digests and system security requirements.
07.02	Demonstrate proper security techniques and monitoring.
07.03	Configure firewall settings using firewall-config, firewall-cmd, or iptables.
07.04	Configure key-based authentication for SSH.
07.05	Set enforcing and permissive modes for SELinux.
07.06	List and identify SELinux file and process context.
07.07	Restore default file contexts.
07.08	Use boolean settings to modify system SELinux settings.

07.09	Diagnose and address routine SELinux policy violations.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Database & E-Commerce Security**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100311
Program Type	College Credit Certificate (CCC)
Program Length	18 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1122 – Information Security Analysts

Purpose

This certificate program is part of the IT Security AS degree program (1511100307).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

The content includes but is not limited to work in Internet, intranet, extranet, and enterprise environments; installing, configuring, designing, and managing secure database and E-commerce resources.

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

Standards

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

01.0 Demonstrate an understanding of computer hardware.
02.0 Demonstrate an understanding of networked environments, hardware, and software.
03.0 Install and configure secure network systems software and utilities.
04.0 Demonstrate proficiency with Internet structure, organization, and navigation.
05.0 Demonstrate an understanding of network access control systems and methodology.
06.0 Describe cryptography concepts, standards, and applications.
07.0 Perform telecommunications and network security activities.
08.0 Demonstrate an understanding of Database Management Systems (DBMS).
09.0 Perform administrative tasks related to database security.
10.0 Demonstrate an understanding of E-commerce.
11.0 Perform tasks related to E-commerce security.
12.0 Perform webserver and site management activities.
13.0 Design and implement physical security measures.
14.0 Perform operation and security management practices.
15.0 Employ applications and systems development security techniques.
16.0 Develop business continuity and disaster recovery plans.
17.0 Describe ethical issues, pertinent laws, and how to conduct investigations.
18.0 Perform general organizational computing workplace competencies.
19.0 Perform project planning and management activities.
20.0 Perform documentation and technical reference activities.
21.0 Demonstrate employability skills.
22.0 Demonstrate professional development skills.

Florida Department of Education
Student Performance Standards

Program Title: **Database & E-Commerce Security**
CIP Number: **0511100311**
Program Length: **18 credit hours**
SOC Code(s): **15-1122**

This certificate program is part of the IT Security AS degree program (1511100307). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of computer hardware. – The student will be able to:
01.01	Describe multiple numbering systems used to represent instructions and data.
01.02	Identify the architecture of major hardware platforms.
01.03	Describe the functions of major hardware components of a computer system.
01.04	Discuss the potential impact of emerging hardware technologies.
01.05	Demonstrate the ability to perform preventive maintenance tasks on microcomputer systems.
01.06	Set up and configure computer systems and peripherals.
01.07	Configure the Basic Input/Output System (BIOS) of a computer system.
01.08	Install and configure storage devices, controllers, and network interfaces.
02.0	Demonstrate an understanding of networked environments, hardware, and software. – The student will be able to:
02.01	Discuss fundamental network concepts such as topology, protocols, architecture, and internetworking.
02.02	Define all layers in the Open Systems Interconnect (OSI) and Transmission Control Protocol/Internetworking Protocol (TCP/IP) network protocol models.
02.03	Discuss the nature of Internetworking Protocol (IP) addresses and Media Access Control (MAC) addresses, and mapping between protocol addressing schemes.
02.04	Describe the functions and hardware requirements for current popular network servers and services.
02.05	Describe the major functions and hardware requirements of network client hardware components.
02.06	Describe current link technologies such as twisted-pair, coaxial, fiber optic, and wireless.
02.07	Describe the major functions of network connectivity hardware.
02.08	Describe the function of network storage devices, storage area networks (SAN), and other peripherals.

03.0	Install and configure secure network systems software and utilities. – The student will be able to:
03.01	Install and configure current leading system software, drivers, and service packs.
03.02	Install, configure and set up a proxy server and a gateway.
03.03	Discuss the functions of authentication protocols and Virtual Private Networks (VPNs).
03.04	Install and configure web servers and related services.
03.05	Use system software to perform routine maintenance tasks such as backup and hard drive defragmentation.
03.06	Install and configure a secure desktop client operating system (OS).
03.07	Describe modifications necessary to an OS such as modifying parameters and how to handle conflicting interrupts when installing, configuring, and upgrading application software.
03.08	Install and configure client software for network-based applications.
03.09	Install and configure current popular network services for servers.
04.0	Demonstrate proficiency with Internet structure, organization, and navigation. – The student will be able to:
04.01	Describe Internet structure and administration.
04.02	Describe common Internet services and port numbers.
04.03	Demonstrate the use of internetworking protocols.
04.04	Differentiate between push and pull technologies.
04.05	Demonstrate the use of typical remote access mechanisms.
04.06	Describe the data format and proprietary nature of commonly used Internet file types.
04.07	Demonstrate use of Internet clients and services.
05.0	Demonstrate an understanding of network access control systems and methodology. – The student will be able to:
05.01	Describe access control mechanisms and their impact on users, resources, and operations.
05.02	Compare and contrast access control techniques.
05.03	Administer computer, group, and user accounts.
05.04	Manage policies, rights, permissions, and passwords for users and/or groups of users.
05.05	Demonstrate an understanding of various access control models.

05.06	Manage password, PIN selection, maintenance, and control.
05.07	Demonstrate an understanding of methods of identification and authentication.
05.08	Implement centralized/remote authentication access controls.
05.09	Implement and manage decentralized access controls such as domain and trust relationships.
05.10	Analyze and explain methods of server attacks.
05.11	Demonstrate an understanding of the different types of network intrusions and the different methods of detection.
05.12	Monitor the network using various forms of intrusion detection resources to detect attacks.
05.13	Investigate audit logs for signs of network intrusions.
05.14	Find and report weaknesses in the access control system using penetration testing.
06.0	Describe cryptography concepts, standards, and applications. – The student will be able to:
06.01	Demonstrate an understanding of the encryption/decryption process.
06.02	Demonstrate an understanding of the basic functions involved in key management.
06.03	Describe methods to achieve confidentiality, integrity, and availability through authentication in a network environment.
06.04	Identify the strengths and weaknesses of cryptographic algorithms and the effects of key length.
06.05	Employ cryptographic algorithms.
06.06	Implement current popular key distribution methods.
06.07	Utilize application and network-based protocols.
06.08	Describe the use of security hardware components.
07.0	Perform telecommunications and network security activities. – The student will be able to:
07.01	Utilize protocol layering models.
07.02	Evaluate the security implications associated with the various physical media types.
07.03	Describe security concerns with using various network topologies.
07.04	Configure authentication protocol service(s) that provide dial-in authentication and security.
07.05	Employ network monitors and packet sniffers to identify security threats.

07.06	Implement security measures using network hardware and software.
07.07	Discuss the security vulnerabilities of the TCP/IP protocol stack.
07.08	Configure Network Layer security protocols.
07.09	Configure Transport Layer security protocols.
07.10	Configure Application Layer security protocols.
07.11	Perform connection verification using current authentication protocols.
07.12	Demonstrate an understanding of how wide area network serial line protocols work.
07.13	Implement secure data communication techniques.
07.14	Develop secure email, facsimile, and voice communication procedures to protect against network attacks.
07.15	Employ alarms and signals to alert network security administrators of intrusions.
08.0	Demonstrate an understanding of Database Management Systems (DBMS). – The student will be able to:
08.01	Compare the major types of databases.
08.02	Describe relational database concepts.
08.03	Analyze the various components of a DBMS.
08.04	Install and configure database server software.
08.05	Perform database administration tasks using the Structured Query Language (SQL).
08.06	Demonstrate an understanding of transaction processing and concurrency control.
08.07	Perform database backup and recovery operations.
09.0	Perform administrative tasks related to database security. – The student will be able to:
09.01	Develop database security guidelines.
09.02	Monitor database security systems.
09.03	Manage web database security.
09.04	Verify security compliance.
09.05	Secure backup processes.

09.06	Verify backup processes.
09.07	Describe techniques to ensure database integrity and security.
10.0	Demonstrate an understanding of E-commerce. – The student will be able to:
10.01	Describe E-commerce and its impact on business and society.
10.02	Differentiate between the various E-commerce business models.
10.03	Discuss the steps necessary to maintain transaction integrity.
10.04	Identify components and procedures necessary to process credit card transactions.
10.05	Describe applicability of and compliance with Payment Card Industry Data Security Standards (PCI-DSS).
11.0	Perform tasks related to E-commerce security. – The student will be able to:
11.01	Manage digital certificates.
11.02	Maintain integrity in transaction storage and reporting systems.
11.03	Protect Personal Identifiable Information (PII) in transaction processes.
11.04	Describe inventory control measures.
11.05	Maintain security related to electronic communication.
11.06	Describe methods used to review third-party transaction processing.
11.07	Evaluate E-commerce platform vulnerabilities.
12.0	Perform web server and site management activities. – The student will be able to:
12.01	Describe the process of obtaining an Internet domain name and mapping it to an Internet Protocol (IP) address.
12.02	Compare features of current website management tools.
12.03	Configure current web server software.
12.04	Use current web server software to maintain secure websites.
12.05	Use web site access tracking and analysis tools to evaluate the security of a web server.
13.0	Design and implement physical security measures. – The student will be able to:
13.01	Identify physical threats and vulnerabilities to an enterprise’s resources.

13.02	Specify possible countermeasures to physically protect an enterprise's resources.
13.03	Develop a list of physical facility requirements to secure the premises.
13.04	Evaluate the feasibility of various technical controls to secure physical resources.
14.0	Perform operation and security management practices. – The student will be able to:
14.01	Perform personnel administrative security operations.
14.02	Implement client and network system security software on an enterprise-wide basis.
14.03	Perform and verify backups of critical information.
14.04	Identify methods to protect the privacy of personal data.
14.05	Demonstrate proper handling of sensitive information and media.
14.06	Demonstrate an understanding of different control types.
14.07	Determine what enterprise resources require protection.
14.08	Compare the advantages and disadvantages of internal versus external audits.
14.09	Perform compliance checks on user adherence to security policies.
14.10	Identify different types of enterprise-wide monitoring tools and techniques.
14.11	Utilize enterprise-wide monitoring tools and techniques.
14.12	Implement countermeasures to defend against threats.
14.13	Perform penetration testing activities.
14.14	Describe principles of risk management and asset valuation.
14.15	Monitor enterprise-wide information for potential liabilities.
14.16	Manage software licenses and enforce compliance within the organization.
15.0	Employ applications and systems development security techniques. – The student will be able to:
15.01	Describe the stages of the system development life cycle.
15.02	Describe security implications of structured programming techniques.
15.03	Analyze the controls that are included within systems and applications software and those used in the development of agents, applets, software, databases, data warehouses and knowledge-based systems.

15.04	Implement features to ensure data and application integrity, security and availability.
15.05	Analyze distributed environment application issues.
15.06	Analyze local environment application issues.
15.07	Analyze key database and data warehousing issues.
15.08	Develop multilevel security schemes for databases and data warehouses.
15.09	Compare different forms of data/information storage.
15.10	Describe different aspects of application and database security control architectures.
15.11	Compare and contrast elevated privileges and user modes of operation.
15.12	Identify various levels of application integrity.
15.13	Describe the impact that malicious code plays in software development.
15.14	Formulate countermeasures to defend against or detect malicious code.
15.15	Establish a secure development environment.
16.0	Develop business continuity and disaster recovery plans. – The student will be able to:
16.01	Perform a business impact assessment.
16.02	Specify the necessary capabilities of alternative business sites.
16.03	Develop business continuity, disaster containment, and recovery plans.
16.04	Identify the impact of scheduled facility maintenance on enterprise systems.
16.05	Develop a testing program for business continuity/disaster recovery plans.
16.06	Develop a training program for personnel regarding business continuity/disaster recovery plans.
17.0	Describe ethical issues, pertinent laws, and how to conduct investigations. – The student will be able to:
17.01	Explain the major categories and types of laws as they relate to information security.
17.02	Describe institutional policies and practices regarding data privacy and intellectual property rights.
17.03	Describe abnormal and suspicious activity as it relates to information security.
17.04	Identify potential data security threats.

17.05	Describe legal institutional policies and practices to protect against purposeful violations of data integrity.
17.06	Identify the major categories of computer crimes and attacks.
17.07	Describe institutional policies and practices to conduct an investigation of security violations.
17.08	Explain major ethical and legal issues related to Internet and system use.
18.0	Perform general organizational computing workplace competencies. – The student will be able to:
18.01	Deliver and follow oral and written technical instructions.
18.02	Prepare and deliver a technical presentation.
18.03	Participate in group discussions as a member and as a leader.
18.04	Explain the importance of self-motivation and responsibility in completing assigned tasks.
18.05	List the steps in problem solving.
18.06	Identify and discuss issues contained within professional codes of conduct.
18.07	Explain ethical aspects of intellectual property rights and licensing issues.
18.08	Identify potential sources of employee/employer or employee/employer conflict and discuss possible approaches to resolve such disagreements.
18.09	Identify appropriate workplace behavior.
18.10	Identify principles and techniques for being a productive, contributing member of a team.
18.11	Identify acceptable strategies for resolving conflict in the workplace.
18.12	Describe principles and techniques for working productively with people of diverse cultures and backgrounds.
18.13	Identify techniques for stress management and prevention of job burnout.
18.14	Identify appropriate communication skills and etiquette.
19.0	Perform project planning and management activities. – The student will be able to:
19.01	List effective time management skills.
19.02	Describe appropriate measures for planning and managing a large project.
19.03	Create an implementation schedule for a large project.
19.04	Describe appropriate measures for planning and implementing upgrades of hardware and software.
19.05	Identify examples of effective end-user training strategies and techniques.

20.0 Perform documentation and technical reference activities. – The student will be able to:
20.01 Demonstrate technical writing skills.
20.02 Identify information in printed and online technical references.
20.03 Prepare documentation to track assets, security-related activities, and incidents.
21.0 Demonstrate employability skills. – The student will be able to:
21.01 Identify sources of employment opportunities.
21.02 Identify employer expectations regarding attendance, punctuality, initiative and teamwork.
21.03 Describe employee rights regarding privacy, discrimination, due process and safety.
21.04 Identify the key requirements of a written job description.
21.05 Identify methods for securing employment references.
21.06 Compose a cover letter and a resume.
21.07 Complete an employment application.
21.08 Classify behaviors considered appropriate or inappropriate in a job interview situation.
21.09 Demonstrate job interview skills.
21.10 Compose a follow-up letter.
21.11 Compose a letter of resignation.
22.0 Demonstrate professional development skills. – The student will be able to:
22.01 Identify corporate strategies and policies for professional development.
22.02 Describe the importance of participating in professional organizations and maintaining professional contacts.
22.03 Explain the importance of mentor relationships.
22.04 Identify industry trends.
22.05 Describe options for continuing education.
22.06 Identify industry journals, magazines and digital media.
22.07 Describe the importance of attending seminars, workshops, and tradeshows.

Additional Information

Laboratory Activities

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

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Florida Department of Education
Curriculum Framework

Program Title: **Project Management Associate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100501
Program Type	College Credit
Standard Length	12 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other

Purpose

This certificate is part of the Technology Project Management AS degree program (1511100509).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as project managers and professionals incorporating IT project management strategies in their business activities in the Information Technology career cluster; provides technical skill proficiency, and competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to balance of business and technology components and allows the student to gain additional skills in the area of Project Management.

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

Standards

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

01.0 Project costs and budgeting.
02.0 Fundamentals of project management.
03.0 Full project life cycle and various project management processes.
04.0 Define stakeholder expectations and initiate a project successfully.
05.0 Create a comprehensive project plan.
06.0 Work in teams, manage team members, and interact with stakeholders.
07.0 Plan and monitor project budget and schedule.
08.0 Basic tools and techniques of managing project quality and risk.
09.0 Principles of identifying, developing, and managing resources.
10.0 Navigating a project experiencing scope, resource, and scheduling constraints through effective communication.
11.0 Technical and human aspects of project control, with a focus on change control.
12.0 Contextual relationship between the project and the organization that hosts the project.
13.0 Ethical considerations in every aspect of a project's operations.

Florida Department of Education
Student Performance Standards

Program Title: **Project Management Associate**
CIP Number: **0511100501**
Program Length: **12 credit hours**
SOC Code(s): **15-1199**

This certificate is part of the Technology Project Management AS degree program (1511100509). At the completion of this program, the student will be able to:	
01.0	Project costs and budgeting. – The student will be able to:
01.01	Demonstrate an understanding of the basic accounting principles and practices.
01.02	Demonstrate an understanding of budgeting.
01.03	Demonstrate an understanding of costing.
01.04	Identify fundamental financial analysis concepts.
01.05	Describe financial analysis tools.
01.06	Understand and interpret financial reports.
02.0	Fundamentals of project management. – The student will be able to:
02.01	Describe the importance of PM in the context of various organizational cultures and strategies, and summarize the typical components of the PM system and the processes that are considered essential to any project.
02.02	Select and describe an appropriate PM strategy for a new project that can meet stakeholder expectations in a given organizational context.
03.0	Full project life cycle and various project management processes. - The student will be able to:
03.01	List and describe the project phases that make up a typical project, and summarize PM processes that occur within each.
03.02	Describe the typical PM process documentation and PM deliverables that are produced by project managers in each project phase.
04.0	Define stakeholder expectations and initiate a project successfully. - The student will be able to:
04.01	Given an organizational context, project objectives, and recommended strategy, develop a sequence of categorized PM processes and activities that will meet stakeholder expectations.
04.02	Create, or identify, a project charter and its primary components, including writing a concise statement of business needs that the project will address.

05.0	Create a comprehensive project plan. - The student will be able to:
05.01	Develop a PM plan that documents the actions necessary to define, coordinate, and measure all project activities, and to ensure control and management of costs and changes to the project.
05.02	Describe the components of the project plan and the interactions of the various processes of the project plan with other processes in the PM system.
06.0	Work in teams, manage team members, and interact with stakeholders. - The student will be able to:
06.01	Select appropriate communication tools and methods to communicate with identified stakeholders, including commonly used templates for communication activities such as status reporting, issues tracking, change control, and project reviews.
06.02	Understand sources of conflict and, given a specific challenge, apply a problem-solving process that focuses on confronting and resolving the problem.
07.0	Plan and monitor project budget and schedule. - The student will be able to:
07.01	Identify necessary labor and material resources, including contracted resources, and estimate how many units of each are required to meet project expectations.
07.02	Describe the fundamental types of time- and cost-estimating approaches and how these are best related to the time line of the project, becoming more specific as more information is known about project requirements, risks, and activities.
08.0	Basic tools and techniques of managing project quality and risk. - The student will be able to:
08.01	Given a specific project context and plan, identify potential project risks and/or opportunities, evaluate each according to criteria for impact on the project, and document them in a prioritized risk register.
08.02	Demonstrate knowledge of the core quality processes and explain the role of each process in planning and managing projects.
09.0	Principles of identifying, developing, and managing resources. - The student will be able to:
09.01	Demonstrate how teams are assigned and formed, and describe the stages of team development.
09.02	Enhance team capability after assessing personal strengths and weaknesses, and develop skills to manage a team and lead others.
10.0	Navigating a project experiencing scope, resource, and scheduling constraints through effective communication. - The student will be able to:
10.01	Demonstrate ability to optimize the project schedule by allocating resources to the critical path.
10.02	Demonstrate ability to optimize schedules to maximize efficiency.
11.0	Technical and human aspects of project control, with a focus on change control. - The student will be able to:
11.01	Demonstrate knowledge of how changes to project scope may affect the project's schedule, cost, and quality, and how to evaluate the impact and recommend a solution that produces the desired project product.
11.02	Describe how to monitor and control variances as they pertain to project cost, schedule, scope, and quality, and how to formally communicate such variances to the stakeholder.
12.0	Contextual relationship between the project and the organization that hosts the project. - The student will be able to:

	12.01	Describe how to manage a project in a matrix organizational structure, and illustrate how to successfully deliver a project when the PM might not be sufficiently empowered.
	12.02	Demonstrate knowledge of key linkages between organizational and project-level issues, including decision making, motivation, and project roles.
	12.03	Demonstrate knowledge and skills in procurement, supply-chain management, finance, cost management, and other business aspects of projects.
13.0	Ethical considerations in every aspect of a project's operations. - The student will be able to:	
	13.01	Given a case study scenario involving ethical considerations, demonstrate how a project can be executed according to the standards of the organization hosting the project.
	13.02	Demonstrate knowledge of situations involving unethical project activities, and best practices for whistle blowing and ethical decision making.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

Phi Beta Lambda and Business Professionals of America (BPA) are the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Technology Project Manager**
Career Cluster: **Information Technology**

CCC	
CIP Number	0511100502
Program Type	College Credit
Standard Length	24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other

Purpose

This certificate is part of the Technology Project Management AS degree program (1511100509).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as project managers and professionals incorporating IT project management strategies in their business activities in the Information Technology career cluster; provides technical skill proficiency, and competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to balance of business and technology components and allows the student to gain additional skills in the area of Project Management.

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

Standards

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

01.0 Demonstration in, and implementation of the main areas of information technology.
02.0 Interactive IT tools covering media, graphics, communications, word processing, spreadsheets, and presentation software skills.
03.0 Project costs and budgeting.
04.0 Human resources management activities.
05.0 Fundamentals of project management.
06.0 Full project life cycle and various project management processes.
07.0 Define stakeholder expectations and initiate a project successfully.
08.0 Create a comprehensive project plan.
09.0 Work in teams, manage team members, and interact with stakeholders.
10.0 Plan and monitor project budget and schedule.
11.0 Basic tools and techniques of managing project quality and risk.
12.0 Principles of identifying, developing, and managing resources.
13.0 Navigating a project experiencing scope, resource, and scheduling constraints through effective communication.
14.0 Technical and human aspects of project control, with a focus on change control.
15.0 Contextual relationship between the project and the organization that hosts the project.
16.0 Ethical considerations in every aspect of a project's operations.

Florida Department of Education
Student Performance Standards

Program Title: **Technology Project Manager**
CIP Number: **0511100502**
Program Length: **24 credit hours**
SOC Code(s): **15-1199**

This certificate is part of the Technology Project Management AS degree program (1511100509). At the completion of this program, the student will be able to:		
01.0	01.0	Demonstration in, and implementation of the main areas of information technology. – The student will be able to:
	01.01	Identify, use and connect hardware components and devices.
	01.02	Demonstrate the proper use and maintenance of PC hardware.
	01.03	Install & configure laptops and other mobile devices.
	01.04	Explain types of networks and connections including TCP/IP, WIFI and SOHO.
	01.05	Troubleshoot device and network issues.
	01.06	Identify and protect against security vulnerabilities for devices and their network connections.
	01.07	Install and support Windows OS.
	01.08	Understand Mac OS, Linux and mobile OS.
	01.09	Follow best practices for safety, environmental impacts, and communication and professionalism.
02.0	Interactive IT tools covering media, graphics, communications, word processing, spreadsheets, and presentation software skills. – The student will be able to:	
	02.01	Describe various interactive media tools and define their purpose & function.
	02.02	Demonstrate knowledge in opening, running and/or creating video clips and sound clips.
	02.03	Demonstrate knowledge of word processing software to create and modify documents in a collaborative environment.
	02.04	Demonstrate knowledge of spreadsheet software to create and modify workbooks to manipulate and analyze data.
	02.05	Demonstrate knowledge of presentation software to create and modify interactive presentations.
	02.06	Demonstrate the ability to work in an electronic collaborative environment.

	02.07 Demonstrate proficiency with project management software.
03.0	Project costs and budgeting. – The student will be able to:
	03.01 Demonstrate an understanding of the basic accounting principles and practices.
	03.02 Demonstrate an understanding of budgeting.
	03.03 Demonstrate an understanding of costing.
	03.04 Identify fundamental financial analysis concepts.
	03.05 Describe financial analysis tools.
	03.06 Understand and interpret financial reports.
04.0	Human resources management activities. – The student will be able to:
	04.01 Describe the importance of human resources.
	04.02 Describe the components of the job requirement and analysis process.
	04.03 Describe the important elements of effective human resource planning.
	04.04 Apply leadership techniques and defend the use of appropriate practices for motivating teams and developing leadership abilities.
05.0	Fundamentals of project management. – The student will be able to:
	05.01 Describe the importance of PM in the context of various organizational cultures and strategies, and summarize the typical components of the PM system and the processes that are considered essential to any project.
	05.02 Select and describe an appropriate PM strategy for a new project that can meet stakeholder expectations in a given organizational context.
06.0	Full project life cycle and various project management processes. - The student will be able to:
	06.01 List and describe the project phases that make up a typical project, and summarize PM processes that occur within each.
	06.02 Describe the typical PM process documentation and PM deliverables that are produced by project managers in each project phase.
07.0	Define stakeholder expectations and initiate a project successfully. - The student will be able to:
	07.01 Given an organizational context, project objectives, and recommended strategy, develop a sequence of categorized PM processes and activities that will meet stakeholder expectations.
	07.02 Create, or identify, a project charter and its primary components, including writing a concise statement of business needs that the project will address.
08.0	Create a comprehensive project plan. - The student will be able to:

	08.01	Develop a PM plan that documents the actions necessary to define, coordinate, and measure all project activities, and to ensure control and management of costs and changes to the project.
	08.02	Describe the components of the project plan and the interactions of the various processes of the project plan with other processes in the PM system.
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	10.01	Identify necessary labor and material resources, including contracted resources, and estimate how many units of each are required to meet project expectations.
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11.0	Basic tools and techniques of managing project quality and risk. - The student will be able to:	
	11.01	Given a specific project context and plan, identify potential project risks and/or opportunities, evaluate each according to criteria for impact on the project, and document them in a prioritized risk register.
	11.02	Demonstrate knowledge of the core quality processes and explain the role of each process in planning and managing projects.
12.0	Principles of identifying, developing, and managing resources. - The student will be able to:	
	12.01	Demonstrate how teams are assigned and formed, and describe the stages of team development.
	12.02	Enhance team capability after assessing personal strengths and weaknesses, and develop skills to manage a team and lead others.
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	13.01	Demonstrate ability to optimize the project schedule by allocating resources to the critical path.
	13.02	Demonstrate ability to optimize schedules to maximize efficiency.
14.0	Technical and human aspects of project control, with a focus on change control. - The student will be able to:	
	14.01	Demonstrate knowledge of how changes to project scope may affect the project's schedule, cost, and quality, and how to evaluate the impact and recommend a solution that produces the desired project product.
	14.02	Describe how to monitor and control variances as they pertain to project cost, schedule, scope, and quality, and how to formally communicate such variances to the stakeholder.
15.0	Contextual relationship between the project and the organization that hosts the project. - The student will be able to:	
	15.01	Describe how to manage a project in a matrix organizational structure, and illustrate how to successfully deliver a project when the PM might not be sufficiently empowered.

	15.02	Demonstrate knowledge of key linkages between organizational and project-level issues, including decision making, motivation, and project roles.
	15.03	Demonstrate knowledge and skills in procurement, supply-chain management, finance, cost management, and other business aspects of projects.
16.0	Ethical considerations in every aspect of a project's operations. - The student will be able to:	
	16.01	Given a case study scenario involving ethical considerations, demonstrate how a project can be executed according to the standards of the organization hosting the project.
	16.02	Demonstrate knowledge of situations involving unethical project activities, and best practices for whistle blowing and ethical decision making.

Additional Information

Laboratory Activities

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

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Accommodations

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Florida Department of Education
Curriculum Framework

Program Title: **Geographic Information System**
Career Cluster: **Information Technology**

	CCC
CIP Number	0545070213
Program Type	College Credit Certificate (CCC)
Program Length	21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other

Purpose

This certificate program is part of the Computer Information Technology AS degree program (1511010305).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

The content includes but is not limited to the creation of maps; creation of geographic data files; manipulation of geographic data; and analysis of geographic data using appropriate software.

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

Standards

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

01.0 Perform general computer application activities.
02.0 Demonstrate an understanding of geographic coordinate systems.
03.0 Perform map creation activities.
04.0 Perform GIS data file creation activities.
05.0 Perform GIS data file manipulation activities.
06.0 Perform GIS analysis activities.
07.0 Perform database operations.

Florida Department of Education
Student Performance Standards

Program Title: Geographic Information System
CIP Number: 0545070213
Program Length: 21 credit hours
SOC Code(s): 15-1199

This certificate program is part of the Computer Information Technology AS degree program (1511010305). At the completion of this program, the student will be able to:	
01.0	Perform general computer application activities. – The student will be able to:
01.01	Select the most efficient method of file organization for a given situation.
01.02	Identify security procedures to maintain integrity of files.
01.03	Create reports using a word processing application.
01.04	Analyze numerical information using a spreadsheet application.
01.05	Create a database for storing information using a database application.
01.06	Communicate using an e-mail program.
01.07	Retrieve information from the Internet.
02.0	Demonstrate an understanding of geographic coordinate systems. – The student will be able to:
02.01	Differentiate between different models for the shape of the earth.
02.02	Describe the characteristics of a global coordinate system.
02.03	Describe the characteristics of a geographic datum.
02.04	Compare and contrast different map projections.
02.05	Detail the characteristic of the Cartesian coordinate system.
02.06	Detail the UTM, UPS and State Plane coordinate systems.
03.0	Perform map creation activities. – The student will be able to:
03.01	Set the appropriate geographic coordinate system for a map in the GIS application.
03.02	Add geographic data layers to a GIS application.

	03.03 Manipulate data files that do not align correctly.
	03.04 Symbolize each layer appropriately.
	03.05 Label map features as needed.
	03.06 Add map components such as legends, titles, scale bars, north arrows.
	03.07 Publish the complete map in paper and electronic formats.
04.0	Perform GIS data file creation activities. – The student will be able to:
	04.01 Subset existing GIS data files to create new files.
	04.02 Combine existing, adjacent GIS data files together to create new files.
	04.03 Collect coordinate information using a GPS receiver in the correct geographical coordinate system.
	04.04 Create new GIS data files using coordinate information.
	04.05 Register aerial photographs or satellite images to a specific geographical coordinate system.
	04.06 Create new GIS data files by digitizing on top of registered images.
05.0	Perform GIS data file manipulation activities. – The student will be able to:
	05.01 Create, delete and move GIS files between folders and computers.
	05.02 Add metadata to GIS files.
	05.03 Set coordinate system information for a GIS file.
	05.04 Reproject GIS files to different coordinate systems.
	05.05 Add and delete fields to a GIS database.
	05.06 Manipulate values of field within the GIS database.
06.0	Perform GIS spatial analysis activities. – The student will be able to:
	06.01 Generalize maps by merging adjacent areas if they contain the same or similar attributes.
	06.02 Overlay GIS files that cover the same area to create new files.
	06.03 Create buffers around map features.
	06.04 Manipulate digital elevation models (DEM's) to create slope, aspect, view shed and hill shade layers.

	06.05 Create density maps from point features.
	06.06 Interpolate point features to create continuous surfaces.
	06.07 Generate spatial statistics on GIS files.
07.0	Perform database operations. – The student will be able to:
	07.01 Build a relational database.
	07.02 Query, display and format data.
	07.03 Save, retrieve and run queries.
	07.04 Build and format reports.
	07.05 Group and summarize data.
	07.06 Insert, update, automatically generate and delete data.
	07.07 Control transaction processing.
	07.08 Create, confirm, modify and remove tables to store data.
	07.09 Apply business rules to ensure data integrity.
	07.10 Restrict user access to tables.
	07.11 Improve query performance.

Additional Information

Laboratory Activities

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

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Virtual & Augmented Reality Technologies**
Career Cluster: **Information Technology**

CCC	
CIP Number	0550041118
Program Type	College Credit Certificate (CCC)
Program Length	19 credit hours
CTSO	Phi Beta Lambda
SOC Codes (all applicable)	15-1132, 27-1011, 27-1014, 27-1024, 27-4032

Purpose

This certificate program is part of the Game Development Design AS or AAS degree program 1550041100.

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

The content includes but is not limited to stereoscopic image acquisition, game engines and their uses, basic techniques for creating interactive applications and how these techniques can be used for Virtual Reality (VR) and Augmented Reality (AR) projects. It mixes together knowledge from a variety of correlated topics, including computer graphics, tracking systems, and perceptual psychology. It targets the key areas of augmented reality (AR) and how to enhance real life objects and environments with digitally generated image overlays. Practical experiences in simulation conceptualization, design, development methodologies, essential programming techniques, Science, Computer Programming, Math, 2D and 3D Art are embedded throughout the program to emphasize the relationship between these areas and the field of immersive technologies.

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

Standards

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

01.0 Identify the tools used in game development.
02.0 Create simple 3D game environments.
03.0 Design game levels using creation tools and editors.
04.0 Code, compile, and execute programs.
05.0 Demonstrate knowledge of object oriented programming and design concepts.
06.0 Develop 3D programs.
07.0 Embed artificial intelligence (AI) methods and algorithms to create and modify games.
08.0 Evaluate artificial intelligence (AI) Path Planning.
09.0 Utilize agent architectures.
10.0 Create decision making systems.
11.0 Create and modify game tree systems.
12.0 Utilize genetic algorithms.
13.0 Create virtual reality environments.

Florida Department of Education
Student Performance Standards

Program Title: Virtual and Augmented Reality Technologies
CIP Number: 0550041118
Program Length: 19 Credit Hours
SOC Code(s): 15-1132, 27-1011, 27-1014, 27-1024 and 27- 4032

This certificate program is part of the Game Development Design AS or AAS degree program 1550041100. At the completion of this program, the student will be able to:
01.0 Identify the tools used in game development. – The student will be able to:
01.01 Identify different computer programming languages used for game development.
01.02 Review different development environments for game development.
01.03 Study automation software for game and software development.
02.0 Create simple 3D game environments. – The student will be able to:
02.01 Reproduce simple objects in different coordinate systems.
02.02 Manipulate screen coordinates to create new game levels.
02.03 Convert and export objects and levels between different 3D environments.
02.04 Create simple shapes and structures that can be exported to games or game editors.
02.05 Modify an existing level in a game using editing tools.
02.06 Create a level that can be ported to an existing game engine or editor.
02.07 Create conditional statements and loops for games.
02.08 Modify sprites to add simple motion to games.
02.09 Develop a simple 2D side scrolling game using a game development software kit.

03.0	Design game levels using creation tools and editors. – The student will be able to:
03.01	Distinguish the different level building tools.
03.02	Examine the game development process and application to help design new tools for building levels.
03.03	Distinguish the different types of levels in terms of fun factor.
03.04	Discuss how to decrease and increase the difficulty for players in each type of game level.
03.05	Create a new level for an existing game that is going to address all the issues of difficulty.
03.06	Create building blocks for game level editors and existing engines.
03.07	Create program that will be able to convert and export levels into game engines and level editors.
03.08	Modify existing items to make them exportable into game engines and level editors.
04.0	Code, compile, and execute programs. – The student will be able to:
04.01	Write pseudocode and flow charts.
04.02	Apply the techniques of functional decomposition to break a programming design problem into smaller pieces.
04.03	Write code documentation.
04.04	Create programs that use all data types (float points, integers, long, double, Boolean, characters, and strings) and operators.
04.05	Create programs that use all existing operators.
04.06	Explain the properties of a variable, such as its name, value, scope, persistence, and size.
04.07	Create programs that use if, else if, and else statements to evaluate conditions.
04.08	Create programs that use logical operators (and, not, or), functions, conditional statements, structured and unstructured data types, and loops.
04.09	Write programs that use classes, data abstraction, encapsulation and polymorphism.
04.10	Test and design tests of software solutions.
04.11	Debug program code.
05.0	Demonstrate knowledge of object oriented programming and design concepts. – The student will be able to:
05.01	Apply principles of object oriented programming (OOP).

06.0	Develop 3D programs. – The student will be able to:
06.01	Use popular existing 3D libraries to draw, move, rotate, scale, and render 2D and 3D graphics.
06.02	Create 3D data files for storing simple 3D objects.
06.03	Discuss articles about techniques and methods of programming 3D graphics.
06.04	Create a design document for their final project using 3D graphics.
06.05	Create programs that will read in 3D items from data files and display the items in 3D on the screen.
06.06	Create their own 3D items to display in the program they write.
06.07	Convert real coordinates to virtual and screen coordinates.
06.08	Discuss different notation for 3D coordinate systems in games.
06.09	Create a 3D world with multiple 3D items and moving cameras.
06.10	Scale and skew all the 3D items in the 3D virtual world relative to their location to the camera to create realism.
06.11	Apply hidden surface removal algorithms.
06.12	Develop the 3D rendering pipeline.
06.13	Summarize articles about new and current 3D rendering hardware on the market.
06.14	Distinguish 3D rendering software and hardware available for developing games.
06.15	Modify programs that do texture mapping.
06.16	Develop 3D texture mapped objects.
06.17	Apply their own texture maps to objects they create.
06.18	Use texture mapping in the final project a 3D game.
06.19	Extract 3D objects in from a file.
06.20	Create 3D objects in a file.
06.21	Use C++ structures to store 3D objects in memory.
06.22	Use C++ classes to store 3D objects in memory.

	06.23 Use data files and classes/structures to store 3D objects in the final project.
	06.24 Create 3D objects that have curved surfaces and adding them to their 3D world of objects.
	06.25 Discuss papers on different ways to program curved surfaces.
	06.26 Use curved surfaces in the final project.
	06.27 Create a design document for a 3D game that they are going to develop.
	06.28 Create a 3D game that uses multiple 3D objects and textures.
	06.29 Modify and writing programming that uses matrices multiplication for moving rotating, scaling objects in 3D.
	06.30 Use matrix multiplication for converting from the real coordinate system to screen coordinates.
	06.31 Summarize articles by giving a class presentation on future of networking and game development.
07.0	Embed artificial intelligence (AI) methods and algorithms to create and modify games. – The student will be able to:
	07.01 Examine the origins of artificial intelligence for games, and the first games to use artificial intelligence.
	07.02 Analyze how AI is used in games.
	07.03 Distinguish the different methods used to create AI for games.
	07.04 Modify existing AI methods for games.
	07.05 Create new AI methods games.
	07.06 Discuss at what level of programming AI starts.
08.0	Evaluate artificial intelligence (AI) Path Planning. – The student will be able to:
	08.01 Research path planning.
	08.02 Discuss the advantages and disadvantages of path planning.
	08.03 Modify existing path planning code to change the behavior of the game's computer controlled characters.
	08.04 Enhance existing games by creating computer controlled characters.
09.0	Utilize agent architectures. – The student will be able to:
	09.01 Modify code for different agent architectures.

	09.02 Create computer controlled characters using agent architectures.
	09.03 Combine aspects of agent architectures systems with other AI methods to create new systems for computer controlled characters.
10.0	Create decision making systems. – The student will be able to:
	10.01 Modify code for different decision making systems.
	10.02 Create computer controlled characters using decision making systems.
	10.03 Combine aspects of decision-making systems with other AI methods to create new systems for computer controlled characters.
11.0	Create and modify game tree systems. – The student will be able to:
12.0	Utilize genetic algorithms. – The student will be able to:
	12.01 Modify code for genetic algorithms systems.
	12.02 Create computer controlled characters using genetic algorithms.
	12.03 Combine aspects of genetic algorithms systems with other AI methods to create new systems for computer controlled characters.
13.0	Create virtual reality environments. – The student will be able to:
	13.01 Modify programs that use different graphics libraries.
	13.02 Use different graphics libraries in the final project and programming assignments.
	13.03 Develop libraries to use with 3D software development.
	13.04 Modify existing programs that use sound and music to add realism in game development.
	13.05 Modify sound systems to add direction and distance to sound effects.
	13.06 Use sound effects in programming assignments.
	13.07 Distinguish different sound file formats with respects to quality, and size.
	13.08 Use sound effects and music in the final project.
	13.09 Modify existing programs that use different types of input devices in game development.
	13.10 Use different input devices in the final project and programming assignments.
	13.11 Use forced feedback devices for input.

13.12	Summarize papers on the future of input devices.
13.13	Create 3D transparent objects.
13.14	Summarize papers on alpha blending programming methods.
13.15	Use transparency or fog in the final project.
13.16	Distinguish partial systems in terms of their uses such as fire and explosions.
13.17	Modify and write programs that use partial systems for special effects.
13.18	Apply physics to particle systems for realism.
13.19	Distinguish different methods for creating shadows.
13.20	Experiment with different lighting effects.
13.21	Modify 3D programs to include lighting and shadow effects in a 3D world.
13.22	Apply light and shadow effects in games to add realism.
13.23	Create light sources and shadows in the final project.
13.24	Modify existing programs that use reflection and refraction.
13.25	Develop programs that use light reflection and refraction.
13.26	Use light reflection and refraction in the final project.
13.27	Modify programs that use texture mapping.
13.28	Create 3D texture-mapped surfaces.
13.29	Use texture mapping in the final project.
13.30	Modify programs that use collision detection and reaction.
13.31	Compare different collision detection algorithms in terms of CPU usage and accuracy.
13.32	Use collision detection in the final project.
13.33	Discuss advantages of different collision methods.
13.34	Modify programs that use visible-surface determination.

13.35	Apply different algorithms for visible-surface determination to determine their effect on the performance of games and the game engines.
13.36	Modify programs that use hidden line removal.
13.37	Apply different algorithms for hidden line removal to determine their effects on the performance on games and the game engines.
13.38	Apply basic physics to a 3D game environment.
13.39	Create simplified calculations to mimic real life physics.
13.40	Manipulate physics functions to be applied to existing data structures that store the 3D world.

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 is/are the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **E-Business Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120101
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other

Purpose

This certificate program is part of the E-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

Standards

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

01.0 Perform project management activities.
02.0 Understand issues related to e-Business.
03.0 Compare and contrast e-Business with traditional business.
04.0 Identify, classify and demonstrate management activities for e-Business.
05.0 Identify legal and ethical issues for e-Business.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Technical Certificate**
CIP Number: **0552120101**
Program Length: **24 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Perform project management activities. – The student will be able to:
01.01	Describe the role of project management (PM) within the organization.
01.02	Identify the strengths and weaknesses of various project life cycle designs.
01.03	Demonstrate the importance of project scope management.
01.04	Compare and contrast project selection methods.
01.05	Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe those different elements.
01.06	Compare and contrast types of cost estimates.
01.07	Examine cost control and earned value analysis.
01.08	Examine organizational planning, staff acquisition, and team development.
01.09	Examine risk identification, quantification, response development, and response control.
01.10	Compare and contrast project tracking and project reporting.
01.11	Understand change control and configuration control.
01.12	Understand subcontracting and outsourcing.
02.0	Understand issue related to e-Business. – The student will be able to:
02.01	Explain the difference between intranet and internet and the role of each in e-Business.
02.02	Explain the history, purpose and use of the World Wide Web and how it has enabled e-business.
02.03	Describe the rise of various e-business models such as information and content models, broadcast/content aggregations models, interactive models, and content provider models.

	02.04 Explain security issues related to electronic payment.
	02.05 Explain issues of advertising, marketing and solicitation activities affecting e-business.
03.0	Compare and contrast e-Business with traditional business. – The student will be able to:
	03.01 Define describe the evolution e-business.
	03.02 Describe how business operations have changed due to e-Business.
	03.03 Explain the basic business models of electronic marketing.
	03.04 Identify critical success factors for electronic marketing.
	03.05 Explain the impact of the Internet on customers and markets for businesses.
	03.06 Describe consumer buying behavior and organizational buying behavior.
	03.07 Explain how service industries conduct business electronically.
	03.08 Describe several innovative applications in the service sector.
	03.09 Identify the various payment options in e-commerce.
	03.10 Explain the strategic planning issues for e-business.
	03.11 Identify the critical success factors of an e-business project/venture.
	03.12 Describe the major components and impact of web-based economics.
04.0	Identify, classify and demonstrate management activities for e-Business. – The student will be able to:
	04.01 Define the role of the entrepreneur in global business-in the United States and across the world.
	04.02 Describe the entrepreneurial profile.
	04.03 Discuss the role of the internet in helping small business expand their global market.
	04.04 Explain the importance of strategic management to a business.
	04.05 Describe the components of a marketing plan and explain the benefits of preparing one.
	04.06 Describe how to prepare financial statements & use them to manage the business.
	04.07 Describe effective pricing strategies.
	04.08 Discuss the links among pricing, image, and competition.

04.09	Explain what seed capital is and why it is so important to the entrepreneurial process.
04.10	Explain the difference in the three types of capital small businesses require: Fixed, Working and Growth.
04.11	Explain the stages in the location decision.
04.12	Describe the location criteria and outline the basic location options for retail and service business.
04.13	Explain purchasing, quality control, vender analysis and managing inventory while using technology to gain a competitive edge.
04.14	Explain the challenges involved in the entrepreneur's role as leader and what it takes to be a successful leader.
04.15	Learn management succession and risk management strategies in family business together with ethics and social responsibility.
04.16	Describe, explain and discuss business's responsibility to employees, customers, investors and the community.
04.17	Describe management's historical role in business operations.
04.18	Compare and contrast different management philosophies.
04.19	Compare and contrast the employees' personal needs with those of the organization.
04.20	Describe methods managers can use to deal with management politics.
04.21	Describe the nature of management's legal environment for traditional and electronic environments.
04.22	Describe the planning process of managers.
04.23	Discuss the characteristics and functions of an organization chart.
04.24	Describe the act and benefits of delegation.
04.25	Summarize the components of job descriptions and specifications.
04.26	Define and describe the activities involved in making a job analysis.
04.27	Discuss potential problems in evaluating employees and methods to avoid problems.
04.28	Discuss strategies managers may use to build and sustain high morale and motivation.
04.29	Describe methods of direct and indirect compensation.
04.30	Describe various employee relations practices.
04.31	Summarize strategies to improve personal and organizational communication.
04.32	Discuss the role of information systems in the control system.

	04.33 Discuss the steps in the basic decision making process.
	04.34 Describe several factors that influence decision-making.
	04.35 Distinguish among management functions.
	04.36 Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
	04.37 Select the most effective communication systems.
	04.38 Identify problems and make an appropriate decision.
05.0	Identify legal and ethical issues for e-Business. – The student will be able to:
	05.01 Describe the procedure to obtaining protection under intellectual property law.
	05.02 Describe and recognize material that is defamatory.
	05.03 Explain the right of publicity and the right of privacy.
	05.04 Explain copyright assignment and the Visual Artists Rights Act.
	05.05 Discuss licensing and registration issues.
	05.06 Describe the importance in choosing a strong trademark.
	05.07 Understand basic laws that apply to e-commerce.
	05.08 Discuss the permission required for linking, revenue-sharing agreements, and liability issues pertaining to linking.
	05.09 Explain other liability issues for ISPs.
	05.10 Differentiate trademark protection and trade secret protection for their property.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Accommodations

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Florida Department of Education
Curriculum Framework

Program Title: **E-Business Security Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120102
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1142 – Network and Computer Systems Administrators

Purpose

This certificate program is part of the E-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

Standards

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

01.0 Design, develop and implement physical, network, host, application, and user security systems for E-Business.
02.0 Maintain and monitor security policies.

Florida Department of Education
Student Performance Standards

Program Title: E-Business Security Technical Certificate
CIP Number: 0552120102
Program Length: 24 credit hours
SOC Code(s): 15-1142

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Design, develop and implement physical, network, host, application and user security systems for e-business. – The student will be able to:
01.01	Explain use and purpose of security policies.
01.02	Conduct a security audit.
01.03	Control access to systems, resources and data.
01.04	Explain and manage system security in common Operating Systems.
01.05	Describe concepts of web servers and their role in the network.
01.06	Plan and implement a web server.
01.07	Identify the various hardware and software requirements for a web server.
01.08	Explain how documents and files are stored on a web server.
01.09	Describe different methods for projecting future traffic on a web server.
01.10	Identify the necessary steps to ensure reliability and response of the server.
01.11	Describe and implement the process for effectively organizing a website.
01.12	Install, configure, and maintain a web server.
01.13	Publish a web document so that it is easily located through various search engines on the Internet.
01.14	Set up the web server so that dynamic content can be provided to users of the website.
01.15	Perform corrective and preventative maintenance on a web server.
01.16	Analyze server log files to determine trends in web server utilization.
01.17	Discuss Internet services operation and the security risk imposed by them on the network.

01.18	Identify vulnerabilities in World Wide Web protocols and counter-measures for securing them.
01.19	Describe the operation of electronic mail and news services protocols and how to effectively secure them.
01.20	Describe the operation of file transfer and printing service protocols and how to effectively secure them.
01.21	Describe the operation of remote access services protocols and how to effectively secure them.
01.22	Describe the operation of real-time conferencing service protocols and how to effectively secure them.
01.23	Properly configure and describe the operation of naming and directory services.
01.24	Describe the operation of authentication and auditing services protocols and how to effectively secure them.
01.25	Describe the operation of administrative services protocols and how to effectively secure them.
01.26	Describe the operation of the IP Security protocol.
01.27	Implement effective measures to secure various service protocols.
02.0	Maintain and monitor security policies. – The student will be able to:
02.01	Identify basic network security.
02.02	Describe purpose and use of packet sniffing, firewalls and proxies.
02.03	Define web server security.
02.04	Protect against the risks of directory browsing.
02.05	Assess client security issues including ActiveX, JavaScript and Cookies.
02.06	Install and configure network security tools.
02.07	Explain the strengths, and weaknesses of cryptography as a security tool.
02.08	Describe authentication and identification schemes.
02.09	Define secure software.
02.10	Describe the use and purpose of encryption.
02.11	Define the advantages of Secure Socket Layer (SSL).
02.12	Define certificate authority.
02.13	Identify basic aspects of intrusion detection and steps to protect the web server from these threats.

02.14 Explain the history of cryptographic methodology.
02.15 Describe cryptographic attack models.
02.16 Describe the secret key and public key encryption methodology.
02.17 Use hashing techniques.
02.18 Use digital signatures in a network environment.
02.19 Explain applied cryptography.
02.20 Use authentication processes in heterogeneous environments.
02.21 Create secure environment through defensive programming.
02.22 Explain the basic elements of Security Testing and Auditing.
02.23 Describe the capabilities of effective signature filter techniques.
02.24 Explain the importance of architectural design detection of intrusions.
02.25 Describe interoperability aspects of various commercial IDS solutions.
02.26 Define and utilize various network based Intrusion Detection Solutions (IDS).
02.27 Detect various exploitation attempts in a network environment.
02.28 Explain intrusion detection and denial of service.
02.29 Describe techniques for gathering intelligence on intrusion detection and the latest tools and techniques used by hackers.
02.30 Define and recognize structured attacks and differentiate from unstructured attacks.
02.31 Explain management issues related to intrusion detection.
02.32 Implement appropriate security measures following risk analysis.
02.33 Implement appropriate security measures to minimize risks from hackers.
02.34 Issue and manage digital certificates.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **E-Business Software Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120103
Program Type	College Credit Certificate (CCC)
Program Length	21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other

Purpose

This certificate program is part of the E-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

Standards

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

01.0 Perform project management activities.
02.0 Conduct systems analysis and design.
03.0 Use various software applications, languages, and protocols for E-Business environment.
04.0 Develop software applications for E-Business environment.
05.0 Maintain systems quality and perform testing activities.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Software Technical Certificate**
CIP Number: **0552120103**
Program Length: **21 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Perform project management activities. – The student will be able to:
01.01	Describe the role of project management (PM) within the organization.
01.02	Identify the strengths and weaknesses of various project life cycle designs.
01.03	Understand the importance of project scope management.
01.04	Compare and contrast project selection methods.
01.05	Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe those different elements.
01.06	Compare and contrast types of cost estimates.
01.07	Examine cost control and earned value analysis.
01.08	Examine organizational planning, staff acquisition, and team development.
01.09	Examine risk identification, quantification, response development, and response control.
01.10	Compare and contrast project tracking and project reporting.
01.11	Understand change control and configuration control.
01.12	Understand subcontracting and outsourcing.
01.13	Discuss and analyze project management case study.
02.0	Conduct systems analysis and design. – The student will be able to:
02.01	Perform a detailed systems investigation and analysis of the project.
02.02	Design the input and output for the system.
02.03	Design the data files for the systems.

02.04	Design the processing flow of the system.
02.05	Design a system to insure that only valid data is accepted and processed, completely and accurately.
02.06	Establish a project plan for the development and implementation of the systems.
02.07	Program and test the system.
02.08	Develop the final systems documentation.
02.09	Conduct necessary training and file conversion to properly implement the system.
02.10	Understand industry-standard models for developing and maintaining software such as the Capability Maturity Model.
02.11	Be able to use industry-standard tools and systems development tools.
03.0	Use various programming software applications, languages and protocols for E-Business environment. – The student will be able to:
03.01	Explain the network protocols.
03.02	Explain how applets differ from applications in terms of program form, operating context, and how they are started.
03.03	Describe and use single- and multi-dimensional arrays.
03.04	Create classes that use inheritance aspects of the object-oriented paradigm.
03.05	Describe the error handling constructs.
03.06	Write a program that reads and writes text files.
03.07	Understand the hierarchy of classes designed for aggregate data such as Collections, and use sets and lists.
03.08	Identify deprecated classes, and explain how to migrate.
03.09	Explain and use event handling in a GUI.
03.10	Differentiate between client-side scripting and server-side scripting.
03.11	Manipulate the objects contained in the Document Object Model (DOM).
03.12	Use variables, constants, and arithmetic operators to create valid arithmetic expressions.
03.13	Dynamically alter the sequence of script execution.
03.14	Use built-in functions as well as create custom functions, subroutines, and procedures within software using scripting languages.
03.15	Create server pages.

03.16	Write programs that implement network connection objects.
03.17	Create and use server-side include files.
03.18	Create programs that communicate across the Internet using conventions such as Remote Method Invocation.
03.19	Understand appropriate use of and demonstrate ability to incorporate and utilize cookies in e-Business software.
03.20	Integrate standard object model components with server pages.
03.21	Create webpages using data from a database.
03.22	Implement programs that use local or remote databases with standard protocols.
03.23	Create applications such as Servlets that send HTML pages to Internet clients.
03.24	Use a scripting language on the server side of a distributed program.
03.25	Use a scripting language on the client side of a distributed program.
03.26	Implement levels of security in distributed software applications and applets.
03.27	Read simple UML diagrams, and create UML documents that model programs.
03.28	Use built-in objects for error handling, file creation, and dictionary access in e-Business software.
03.29	Understand the use of client-side operating system tools.
03.30	Produce software that can interface with operating system services used to broadcast messages within a domain.
03.31	Utilize appropriate operating system interfaces to redirect output.
03.32	Explain and implement emerging trends in XML-related technologies.
03.33	Explain and use the different elements that make code easier to read.
03.34	Explain and use the different data types available in scripting languages.
03.35	Explain and use standard control structures such as repetition, selection, and sequence in the appropriate programming language.
03.36	Output data from scripting languages.
03.37	Explain the benefits of using subroutines and libraries in code.
03.38	Debug code from scripting languages.
03.39	Explain basic Internet and server-side scripting security issues and common techniques to fix them.

03.40	Use a scripting language to create and manage form data submitted over the Internet.
03.41	Examine the use of shopping carts on the Internet and how scripting languages.
03.42	Examine the use of auctions via the Internet and how scripting languages.
03.43	Understand industry standard program design techniques.
03.44	Develop the logic for a program using both flowcharting and pseudo code.
03.45	Develop looping and nested looping logic.
03.46	Develop the logic of: three-level control break program, an extract program, an edit program, a file matching and an update program.
04.0	Develop software applications for E-Business environment. – The student will be able to:
04.01	Design software applications that are accessible by a variety of wireless and wired devices.
04.02	Explain alternatives to dynamic content.
04.03	Integrate the push model of information delivery.
04.04	Use operating system services such as a personal web server for database development.
04.05	Explain server security and permissions.
04.06	Evaluate the advantages/disadvantages of different server platforms.
04.07	Explain scripting concepts and syntax.
04.08	Connect to common databases using standard protocols.
04.09	Display data from a database using a web interface.
04.10	Write and modify a database record using a web interface.
04.11	Enable web security features.
04.12	Design and implement a basic shopping cart application.
05.0	Maintain systems quality and perform testing activities. – The student will be able to:
05.01	Identify the advantages and disadvantages of client-server computing.
05.02	Establish controls in a client-server framework.
05.03	Explain software testing methodology.

05.04	Describe the planning, executing and controlling of the testing process.
05.05	Perform Graphical User Interface testing.
05.06	Explain the server applications testing processes.
05.07	Explain testing in a networked application environment.
05.08	Incorporate cross-level functional testing within a data-driven framework-based environment.
05.09	Use client-server testing metrics.
05.10	Explain testing integration on the desktop.
05.11	Explain testing for web-based client-server applications.
05.12	Select and use appropriate automated test tools.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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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.

Florida Department of Education
Curriculum Framework

Program Title: **E-Business Technology Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120104
Program Type	College Credit Certificate (CCC)
Program Length	21 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other

Purpose

This certificate program is part of the E-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

Standards

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

01.0 Perform project management activities.
02.0 Demonstrate proficiency in the use of web browsers and access to Internet resources.
03.0 Conduct systems analysis and design.
04.0 Perform web server management activities.
05.0 Support E-Business applications and product development.
06.0 Maintain network infrastructure.
07.0 Perform technical requirements to support UNIX operating system.
08.0 Maintain systems quality and perform testing activities.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Technology Technical Certificate**
CIP Number: **0552120104**
Program Length: **21 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Perform project management activities. – The student will be able to:
01.01	Describe the role of project management (PM) within the organization.
01.02	Identify the strengths and weaknesses of various project life cycle designs.
01.03	Understand the importance of project scope management.
01.04	Compare and contrast project selection methods.
01.05	Build a Work Breakdown Structure (WBS), Gantt chart, and Pert Chart and describe those different elements.
01.06	Compare and contrast types of cost estimates.
01.07	Demonstrate cost control and earned value analysis.
01.08	Examine organizational planning, staff acquisition, and team development.
01.09	Examine risk identification, quantification, response development, and response control.
01.10	Compare and contrast project tracking and project reporting.
01.11	Understand change control and configuration control.
01.12	Understand subcontracting and outsourcing.
01.13	Discuss and analyze project management case study.
02.0	Demonstrate proficiency in the use of web browsers and access to internet resources. – The student will be able to:
02.01	Describe proper Internet etiquette and usage.
02.02	Explain how to connect to the Internet.
02.03	Explain the purpose and use of browsers and search engines.

02.04	Understand and use web browser tools to navigate the web.
02.05	Demonstrate proficiency in electronic communication technologies by using email, setting up email accounts, and explaining communication and privacy issues specific to email.
02.06	Explain communication issues specific to email.
02.07	Participate in an email a web-based discussion group.
02.08	Explain the guidelines for evaluating information needs before beginning a search an electronic search.
02.09	Explain issues associated with pornography, free speech, censorship, filtering, and copyright on the web.
02.10	Describe how to critically evaluate online information content.
02.11	Capture images, text, sound, and data from web pages.
02.12	Work with File Transfer Protocol (FTP) clients.
03.0	Conduct systems analysis and design. – The student will be able to:
03.01	Perform a detailed systems investigation and analysis of the project.
03.02	Design the input and output for the system.
03.03	Design the data files for the systems.
03.04	Design the processing flow of the system.
03.05	Design a system to insure that only valid data is accepted and processed, completely and accurately.
03.06	Establish a project plan for the development and implementation of the systems.
03.07	Program and test the system.
03.08	Develop the final systems documentation.
03.09	Conduct necessary training and file conversion to properly implement the system.
03.10	Understand industry-standard models for developing and maintaining software.
03.11	Use industry-standard systems development tools.
04.0	Perform Web Server Management activities. – The student will be able to:
04.01	Perform console management in the author and user mode.

04.02	Create and navigate a custom management console.
04.03	Create new user accounts.
04.04	Implement groups into a domain.
04.05	Change the domain mode.
04.06	Manage software settings, scripts, and security settings.
04.07	Manage administrative templates.
04.08	Manage folder redirection.
04.09	Configure and administer network printers.
05.0	Support e-Business applications and product development. – The student will be able to:
05.01	Identify the different components to systems development life cycle and how they are interrelated.
05.02	Identify deliverables for user project and build subprojects within lifecycle components.
05.03	Create physical structure of web-based architecture.
05.04	Create requirements for business request, develop web components necessary to satisfy request and test for acceptance.
05.05	Use web browser and web authoring tools.
05.06	Write required queries to get required answer sets.
06.0	Maintain network infrastructure. – The student will be able to:
06.01	Identify web server hardware and evaluate performance.
06.02	Describe security threat countermeasures.
06.03	Identify basic components of electronic payment systems.
06.04	Identify how to create and maintain an effective web presence and brand.
06.05	Describe various Electronic Data Interchange components.
06.06	Define and explain virtual communities and web portals.
06.07	Identify challenges of a global business regarding culture, legal and financial impacts, and differing languages.
06.08	Identify the planning stages of the e-Business project.
06.09	Identify web server hardware and evaluate performance.

07.0	Perform technical requirements to support UNIX operating system. – The student will be able to:
07.01	Explain basic command syntax for governing the file-system, printing and process control.
07.02	Identify and use editors.
07.03	Schedule and reprioritize processes.
07.04	Use commands to get information and communicate with remote users.
07.05	Search for strings of text in files using shell meta-characters.
07.06	Use common tools to generate reports or filter text.
07.07	Use shell scripts to control flow, input, output and jobs.
07.08	Troubleshoot system problems.
08.0	Maintain systems quality and perform testing activities. – The student will be able to:
08.01	Identify the advantages and disadvantages of client-server computing.
08.02	Establish controls in a client-server framework.
08.03	Explain software testing methodology.
08.04	Describe the planning, executing and controlling of the testing process.
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Florida Department of Education
Curriculum Framework

Program Title: **E-Business Ventures Technical Certificate**
Career Cluster: **Information Technology**

CCC	
CIP Number	0552120105
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other

Purpose

This certificate program is part of the e-Business Technology AS degree program (1552120107).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

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

Standards

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

01.0 Understand issues related to e-Business.
02.0 Compare and contrast e-Business with traditional business.
03.0 Identify, classify, and demonstrate management activities for e-Business.
04.0 Identify legal and ethical issues for e-Business.

Florida Department of Education
Student Performance Standards

Program Title: **E-Business Ventures Technical Certificate**
CIP Number: **0552120105**
Program Length: **24 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the E-Business Technology AS degree program (1552120107). At the completion of this program, the student will be able to:	
01.0	Understand issues related to e-Business. – The student will be able to:
01.01	Explain the difference between intranet and internet and the role of each in e-Business.
01.02	Explain the history, purpose and use of the World Wide Web and how it has enabled e-Business.
01.03	Describe the rise of various e-Business models such as information and content models, broadcast/content aggregations models, interactive models, and content provider models.
01.04	Explain security issues related to electronic payment.
01.05	Explain issues of advertising, marketing and solicitation activities affecting e-Business.
02.0	Compare and contrast e-Business with traditional business. – The student will be able to:
02.01	Describe the evolution of e-Business, how it changed the marketplace, and the benefits to society.
02.02	Define e-Business and its categories.
02.03	Describe how business operations have changed due to e-Business.
02.04	Explain the basic business models of electronic marketing.
02.05	Identify critical success factors for electronic marketing.
02.06	Explain the impact of the Internet on customers and markets for businesses.
02.07	Describe consumer buying behavior and organizational buying behavior.
02.08	Explain how service industries conduct business electronically.
02.09	Describe several innovative applications in the service sector.
02.10	Explain how business-to-business commerce is conducted.

02.11	Describe the application and key technologies for business- to-business e-commerce models.
02.12	Describe the relationship between the Internet, intranet and extranet.
02.13	Describe the typical electronic payment system.
02.14	Identify the various payment options in e-commerce.
02.15	Explain the strategic planning issues for e-Business.
02.16	Identify the critical success factors of an e-Business project/venture.
02.17	Discuss contractual issues and copyright infringement on the web.
02.18	Explain the global economics and its impact e-Business.
02.19	Describe the major components and impact of web-based economics.
03.0	Identify, classify and demonstrate management activities for e-Business. – The student will be able to:
03.01	Define the role of the entrepreneur in business-in the United States and across the world.
03.02	Describe the entrepreneurial profile.
03.03	Discuss the role of the internet in helping small business expand their market opportunities both in the United States and abroad.
03.04	Explain the importance of strategic management to business.
03.05	Describe the components of a marketing plan and explain the benefits of preparing one.
03.06	Describe how to prepare financial statements & use them to manage the business.
03.07	Describe effective pricing strategies.
03.08	Discuss the links among pricing, image, and competition.
03.09	Explain what seed capital is and why it is so important to the entrepreneurial process.
03.10	Explain the difference in the three types of capital that small businesses require: Fixed, Working and Growth.
03.11	Explain the stages in the location decision.
03.12	Describe the location criteria and outline the basic location options for retail and service business.
03.13	Explain purchasing, quality control, vender analysis and managing inventory while using technology to gain a competitive edge.
03.14	Explain the challenges involved in the entrepreneur's role as leader and what it takes to be a successful leader.

03.15	Learn management succession and risk management strategies in family business together with ethics and social responsibility.
03.16	Describe, explain and discuss business's responsibility to employees, customers, investors and the community.
03.17	Describe management's historical role in business operations.
03.18	Compare and contrast different management philosophies.
03.19	Compare and contrast the employees' personal needs with those of the organization.
03.20	Describe methods managers can use to deal with management politics.
03.21	Describe the nature of management's legal environment for traditional and electronic environments.
03.22	Describe the planning process of managers.
03.23	Discuss the characteristics and functions of an organization chart.
03.24	Describe the act and benefits of delegation.
03.25	Summarize the components of job descriptions and specifications.
03.26	Define and describe the activities involved in making a job analysis.
03.27	Discuss potential problems in evaluating employees and methods to avoid problems.
03.28	Discuss strategies managers may use to build and sustain high morale and motivation.
03.29	Describe methods of direct and indirect compensation.
03.30	Describe various employee relations practices.
03.31	Summarize strategies to improve personal and organizational communication.
03.32	Discuss the role of information systems in the control system.
03.33	Discuss the steps in the basic decision making process.
03.34	Describe several factors that influence decision-making.
03.35	Distinguish among management functions.
03.36	Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
03.37	Select the most effective communication systems.
03.38	Identify problems and make an appropriate decision.

04.0	Identify legal and ethical issues for e-Business. – The student will be able to:
04.01	Describe the procedure to obtaining protection under each intellectual property law.
04.02	Describe and recognize material that is defamatory.
04.03	Explain the right of publicity and the right of privacy.
04.04	Explain copyright assignment and the Visual Artists Rights Act.
04.05	Discuss licensing text, photos, films, television clips, characters, and games, Domain name registration, cybersquatting and anti-cybersquatting regulations.
04.06	Describe the importance in choosing a strong trademark.
04.07	Understand basic laws that apply to e-commerce.
04.08	Explain how Article Two of the UCC that applies to the sale of goods involved in e-Business.
04.09	Discuss current US laws that regulate e-Business, such as the Uniform Computer Information Transactions Act, clickwraps, sales tax, and advertising.
04.10	Explain the meaning of linking, framing and caching.
04.11	Discuss the permission required for linking, revenue-sharing agreements, and liability issues pertaining to linking.
04.12	Discuss e-mail litigation, including anti-spam laws.
04.13	Describe licensing music for use.
04.14	Discuss copyright issues important to ISPs.
04.15	Explain other liability issues for ISPs, such as, defamation, privacy, trademark and patent.
04.16	Discuss when to use trademark protection and trade secret protection for their property.

Additional Information

Laboratory Activities

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

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Florida Department of Education
Curriculum Framework

Program Title: **Business Intelligence Professional**
Career Cluster: **Information Technology**

	CCC
CIP Number	0552130101
Program Type	College Credit Certificate (CCC)
Standard Length	20 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Others

Purpose

This certificate program is part of the Business Intelligence Specialist AS degree program (1552130100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

The content includes but is not limited to instruction in documenting specifications for business reports; locating, acquiring and modeling data for analysis and output; building and generating reports; and business intelligence techniques.

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

Standards

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

01.0 Provide standard report specifications and generate standard or custom reports that summarize business, financial, or economic data for review by stakeholders.
02.0 Define and differentiate among data constraints, filters, exception threshold, and data organization factors important in the creation of a report.
03.0 Locate, acquire, and model the data for analysis and output.
04.0 Compare and contrast the various forms for report presentation.
05.0 Describe the advantages and disadvantages for various report delivery mechanisms.
06.0 Reassess current business intelligence or trend data in support of altered information needs.

Florida Department of Education
Student Performance Standards

Program Title: **Business Intelligence Professional**
CIP Number: **0552130101**
Program Length: **20 credit hours**
SOC Code(s): **15-1199**

This certificate program is part of the Business Intelligence Specialist AS or AAS degree program (1552130100). At the completion of this program, the student will be able to:		
01.0	Provide standard report specifications and generate standard or custom reports that summarize business, financial, or economic data for review by stakeholders. – The student will be able to:	
01.01	Compare attributes and benefits of available data sources.	
	01.01.1	RDBMS.
	01.01.2	Data warehouse and OLAP Cubes.
	01.01.3	Spreadsheet.
	01.01.4	XML.
	01.01.5	CSV.
	01.01.6	Web service.
	01.01.7	Raw Data and other (KML/Shape).
01.02	Define report data elements/requirements (metadata).	
	01.02.1	Dimensions.
	01.02.2	Type I (As is – current).
	01.02.3	Type II (Historical – slowly changing).
	01.02.4	Facts.
	01.02.5	Base.
	01.02.6	Summaries.
	01.02.7	Calculated fields.
	01.02.8	Periodicity.
	01.02.9	Relationships/JOINs.

01.03	Describe how data is to be used.
01.03.1	Data mining.
01.03.2	Filtering.
01.03.3	Exception threshold alerts.
01.03.4	Aggregating.
01.03.5	Snapshot.
01.03.6	Dynamic.
01.03.7	Historical/archive/disposal.
01.04	Determine the form of analysis.
01.04.1	Comparative analysis.
01.04.2	Impact analysis.
01.04.3	Correlational (affinity) analysis.
01.04.4	Trending/Forecasting.
02.0	Define and differentiate among data constraints, filters, exception threshold, and data organization factors important in the creation of a report. – The student will be able to:
02.01	Distinguish between data constraints and filters and their appropriate use.
02.02	Describe how each of the following data constraints relates to the creation and/or delivery of a report.
02.02.1	Size of recordset (scope & performance).
02.02.2	Time/period (end points and span).
02.02.3	Range (e.g., # of records).
02.02.4	Data element (e.g., type, size).
02.02.5	Localization (programming & display language).
02.03	Describe how each of the following types of filters may be used to refine or enhance a report.
02.03.1	Dimensions (Type I and Type II).
02.03.2	Facts (e.g., base, summaries, calculated fields).
02.04	Illustrate how the use of an exception threshold contributes to the operational effectiveness of a report.

	02.04.1	Display or action dependent on threshold.
	02.04.2	Triggers alert or advance warning of approaching static threshold.
	02.04.3	Highlights results exceeding dynamic threshold.
02.05	Compare and contrast the following forms of data organization in terms of representation and analysis of data results.	
	02.05.1	GROUP BY.
	02.05.2	ORDER BY (SORT).
	02.05.3	Concatenation/substring.
	02.05.4	KRAN.
03.0	Locate, acquire, and model the data for analysis and output. – The student will be able to:	
03.01	Identify the types of data that might be used to create business intelligence reports in support of the organization's business and financial strategic goals.	
	03.01.1	Inventory repositories.
	03.01.2	Sales data.
	03.01.3	Customer data.
	03.01.4	Employee/staffing data.
	03.01.5	Financial data.
	03.01.6	Spatial data.
	03.01.7	Security and Risk.
03.02	Describe the risks and potential areas of concern related to the use of external data.	
	03.02.1	Integrity/validity of data.
	03.02.2	Legality of data availability.
	03.02.3	Privacy issues of data acquired.
	03.02.4	Confidentiality of acquisition.
03.03	Describe potential issues, concerns, and obstacles associated with the use of data sources.	
	03.03.1	Data form.

03.03.2	Data integrity.
03.03.3	Normalization.
03.03.4	Cleaning.
03.04	Describe the role and implications of standardization relative to internal and external data sources.
03.04.1	Describe the need for data typing and transformation.
03.04.2	Describe the methods by which transformation may be accomplished.
04.0	Compare and contrast the various forms for report presentation. – The student will be able to:
04.01	Describe the form of data required for using a report generator.
04.02	Describe the form of data required for using a spreadsheet.
04.03	Describe the form of data required for using a database.
04.04	Describe the form of data required for using an OLAP Cube or hypercube.
04.05	Describe the attributes of a report suitable for presentation in HTML/Flash.
04.06	Describe the form of data required for using a graph.
04.07	Describe the form of data required using a dashboard interface.
05.0	Describe the advantages and disadvantages for various report delivery mechanisms. – The student will be able to:
05.01	Email.
05.02	Web-based.
05.03	Mobile device.
05.04	Intranet.
05.05	Print/PDF.
05.06	Oral presentation.
06.0	Reassess current business intelligence or trend data in support of altered information needs. – The student will be able to:
06.01	Identify and relate report design constraints and their relationship to data.
06.02	Evaluate current technology in terms of compatibility and capacity for meeting new or evolving information needs.

06.03	Re-construct report based on alternative parameters.
06.04	Adapt and validate report based on new requirements.

Additional Information

Laboratory Activities

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

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Florida Department of Education
Curriculum Framework

Program Title: **Computer Information Data Specialist**
Career Cluster: **Information Technology**

CCC	
CIP Number	0611050101
Program Type	College Credit Certificate (CCC)
Standard Length	9 credit hours
CTSO	Phi Beta Lambda, BPA
SOC Codes (all applicable)	15-1051 – Computer Systems Analysts

Purpose

The purpose of this program is to prepare students for initial employment as a computer systems analyst. This program may also be used to provide supplemental training for persons previously or currently employed in these occupations.

This certificate program is part of the Computer Information Technology AS degree program (1511010307).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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

The content includes but is not limited to microcomputer oriented operating procedures, software applications packages, and hardware in order to select the appropriate information technology equipment for a particular microcomputer-based work environment; install information technology equipment, troubleshoot information technology equipment, and support information technology users.

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

Standards

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

01.0 Install, configure, upgrade and troubleshoot computer hardware.
02.0 Install, configure and troubleshoot system and device driver software and implement basic security measures.
03.0 Create and maintain a database.
04.0 Demonstrate knowledge of networking technologies.

Florida Department of Education
Student Performance Standards

Program Title: **Computer Information Data Specialist**
CIP Number: **0611050101**
Program Length: **9 credit hours**
SOC Code(s): **15-1051**

This certificate program is part of the Computer Information Technology AS degree program (1511010307). At the completion of this program, the student will be able to:	
01.0	Install, configure, upgrade and troubleshoot computer hardware. – The student will be able to:
01.01	Describe the architecture and operation of a typical computer system.
01.02	Describe the use of binary numbers to represent instructions and data and the hardware implications.
01.03	Identify various coding schemes including ASCII and other data types.
01.04	Describe and identify motherboards and their components.
01.05	Describe the features and types of computer form factors, chassis, power supplies and cooling devices.
01.06	Describe and identify mass storage devices.
01.07	Distinguish between the different display devices and their characteristics.
01.08	Summarize the function and types of adapter and interface cards.
01.09	Construct and configure a computer system from individual components.
01.10	Perform file and system management tasks.
01.11	Perform the installation, configuration, optimization, maintenance, and upgrading of printers and other peripheral devices.
01.12	Troubleshoot new and existing computers and peripheral devices, and document the problems discovered and the solutions implemented.
01.13	Troubleshoot client-side network connectivity issues using appropriate tools.
01.14	Identify potential hazards and implement proper safety procedures, including electrostatic discharge (ESD) precautions and professional operational procedures, safe work environment and equipment handling.
02.0	Install, configure and troubleshoot software system and device driver software and implement basic security measures. – The student will be able to:
02.01	Describe the various types of device drivers used by operating systems and the utilities used to install, configure, manage, upgrade and troubleshoot system devices.

02.02	Describe the device and driver installation process.
02.03	Identify, install, configure, and troubleshoot device drivers.
02.04	Verify digital signatures of device drivers.
02.05	Configure driver policies.
02.06	Describe the security tools and features in operating systems and how to access them to perform a security audit and update.
02.07	Install, configure and monitor firewalls to block dangerous incoming and outgoing network traffic.
02.08	Install, configure and monitor anti-virus software.
02.09	Perform anti-virus and other security scanning activities to prevent the infiltration of spyware and other malicious software.
02.10	Install, configure and monitor updates, and perform system audits.
02.11	Install, configure, upgrade, monitor and optimize security measures and policies.
02.12	Perform preventive maintenance and activity monitoring for computer and network security.
03.0	Create and maintain a database. – The student will be able to:
03.01	Define what a database is and describe the components and structures of relational databases.
03.02	Explain the fundamental concepts of database design.
03.03	Design a relational database with multiple tables.
03.04	Determine the appropriate field data type and field size for fields in a table.
03.05	Create and modify tables, queries, forms and reports.
03.06	Insert, update, and delete data and records.
03.07	Create basic table relationships and relate tables in a database.
03.08	Identify the data elements by which to relate tables.
03.09	Describe foreign keys and their use when relating tables.
03.10	Interpret an entity relationship diagram for modeling a database.
03.11	Describe the purpose of SQL statements.
03.12	Define, describe and implement a query.

03.13	Write and implement basic queries formatted for specific output.
03.14	Retrieve information from a database by using query and filter tools.
03.15	Describe the use of SELECT statements including the use of various JOIN, SUBQUERIES, and conditional expressions.
03.16	Describe the advantages of using an index, and implement different types of indexes on tables.
03.17	Perform basic database maintenance.
03.18	Monitor and analyze database performance.
03.19	Backup and restore a database.
04.0	Demonstrate knowledge of networking technologies. – The student will be able to:
04.01	Identify the advantages and disadvantages of networked and non-network environments.
04.02	Describe current networked environments, such as peer-to-peer and client/server.
04.03	Identify and discuss issues such as security, privacy and redundancy related to networked environments.
04.04	Identify and discuss issues related to naming conventions for domains, hosts, users, email, and network devices.
04.05	Differentiate between telecommunications and data communications.
04.06	List and define the layers in the OSI and TCP/IP network protocol models.
04.07	Identify and describe current relevant IEEE network standards.
04.08	Describe and illustrate the typical logical and physical network topologies, and explain the advantages and disadvantages of each topology.
04.09	Describe the major functions and implementation of LAN hardware protocols such as Ethernet, and identify the physical components currently in use.
04.10	Describe the LAN software protocols in current use.
04.11	Discuss the characteristics of IP addresses and MAC addresses, and mapping between protocol addressing schemes.
04.12	Differentiate between hardware used to implement different network topologies, including bus, ring and star.
04.13	Identify and describe the current cable technologies, including shielded and unshielded twisted-pair, coaxial, and fiber optic, and their features including bandwidth, performance, plenum characteristics, and interference rejection.
04.14	Describe current wireless technologies including Wi-Fi, blue tooth, satellite, microwave, radio and infrared.
04.15	Describe the advantages and disadvantages of wireless and cable technologies, and identify the environments best suited for each technology.

04.16	Describe the functions and characteristics of network connectivity hardware, included hubs, repeaters, bridges, switches, access units, routers, and gateways.
04.17	Describe the hardware needed to connect a local area network to a wide area network and the Internet.
04.18	Compare and contrast major functions and features of current network operating systems, including directory and other services.
04.19	Describe the major functions of network server hardware and software components.
04.20	Install and configure a network server, including the installation of network hardware and software.
04.21	Describe the major functions of network client hardware and software components.
04.22	Install and configure network client software on multiple computer platforms with support for multiple network protocols.
04.23	Describe the function of network storage devices and other peripherals, including NAS, SAN, RAID, tape backup, printers, telecommunications devices, scanners, copiers, imaging devices, and document center equipment.
04.24	Install and configure storage devices and other peripherals with network access.
04.25	Install, configure, update and troubleshoot network drivers for network hosts and peripherals.
04.26	Configure and troubleshoot network protocol stacks.
04.27	Describe the characteristics of the current wide area network technologies and determine the most suitable WAN technology for a given situation.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Articulation

To be transferable statewide between institutions, this program must have been reviewed, and a “transfer value” assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.