CISCO II Honors
11-12, Career & Technical Education

Developed By: Mr. Vance Campbell & Mr. Vincent Vicchiariello
Effective Date: Fall 2023
Scope and Sequence

Month	Module	Activities
September	Module 1 - Single-Area OSPF Concepts & Network Security Module 1 - Single-Area OSPFv2 Concepts Module 2 - Single-Area OSPFv2 Configuration	Part 1: Build the Network and Configure Basic Device Settings Part 2: Configure and Verify Single-Area OSPFv2 for basic operation Part 3: Optimize and Verify the Single-Area OSPFv2 configuration
October	Module 3 - Network Security Concepts	Lab 1: Research Social Engineering Examples Lab 2: Recognize the Signs of Social Engineering Lab 3: Research Ways to Prevent Social Engineering Lab 4: Capture DNS Traffic Lab 5: Explore DNS Query Traffic Lab 6: Explore DNS Response Traffic
November	Module 4 - ACL Concepts Module 5 - ACLs for IPv4 Configuration Module 6 - NAT for IPv4	Lab 1: Build the Network and Configure Basic Device Settings Lab 2: Configure and Verify Extended Access Control Lists Lab 3: Manually configure trunks Lab 4: Configure all network devices for basic SSH support. Lab 5: Configure PC hosts. Part 1: Build the Network and Configure Basic Device Settings Step 1: Configure basic settings for each switch Step 2: Configure basic settings for each router. Step 3: Configure NAT on R1 using a pool of three addresses, 209.165.200.226-209.165.200.228 Step 4: Test and Verify the configuration on NAT & PAT
December	Module 7 - WAN Concepts Module 8 - VPN and IPsec Concepts	Lab 1: Research Broadband Internet Access Technologies Lab 2: Investigate Broadband Distribution Step 1: Research broadband distribution Step 2: Research broadband distribution in the United States. Step 3: Examine the All Providers Reporting area of the output Create Videos - IPsec Transport and Tunnel Mode
January	Module 9 - QoS Concepts Module 10 - Network Management	Lab: Check Your Understanding - QoS Implementation Techniques Part 1: Build the Network and Configure Basic Device Settings Part 2: Network Discovery with CDP Part 3: Network Discovery with LLDP Part 4: Configure and Verify NTP
February	Module 11 - Network Design	Create Video: Three-Layer Network Design Packet Tracer: Borderless Switched Networks Part 1: Access, Distribution, and Core Layer Functions Part 2: Three-Tier and Two-Tier Examples Part 3: Role of Switched Networks (Build and configure)
March	Module 12 - Network Troubleshooting	PT - based on 12.1.2 build and configure

April	Module 13 - Network Virtualization	Lab 1: Establish a Network Baseline using PT
		Step 1: Determine What Types of Data to Collect
		Step 2: Identify Devices and Ports of Interest
		Step 3: Determine the Baseline Duration
		Step 4: Data Measurement
		Step 5: Troubleshoot and repair
		Lab 2: Linux in a virtual Machine and explore the GUI
		Part 1: Prepare a Computer for Virtualization
		Part 2: Install a Linux OS on the Virtual Machine
		Part 3: Explore the GUI
May	Module 14 - Network Automation	Create a video on REST
June	Module 14 - Network Automation	Create Video: DNA Center Troubleshooting User Connectivity

Module 1-2
Single-Area OSPF Concepts & Network Security
Summary and Rationale
OSPF (Open Shortest Path First) is a link-state routing protocol that was developed as an alternative for the distance vector Routing Information Protocol (RIP). OSPF has significant advantages over RIP in that it offers faster convergence and scales to much larger network implementations. This module covers basic, single-area OSPF implementations and configurations. Unauthorized access to data, computer, and network systems is a crime in many jurisdictions and often is accompanied by severe consequences, regardless of the perpetrator's motivations. It is the learner's responsibility, as the user of this material, to be cognizant of and compliant with computer use laws.
Recommended Pacing
4 Weeks
Standards

9.3 Career and Technical Education (Link)

Career Cluster: Information Technology (IT)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.

Pathway: Information Support & Services (IT-SUP)	
9.3.IT-SUP.1	Provide technology support to maintain service.
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.
NJSLS: Computer Science & Design Thinking (2020) (Link)	
Computing Systems	
8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.
8.1.12.CS.2	Model interactions between application software, system software, and hardware.
Engineering Design	
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)	
9.2 Career Awareness, Exploration, Preparation, and Training	
9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
9.4 Life Literacies and Key Skills	

9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

Instructional Focus

Enduring Understandings:	Essential Questions:
- How single-area OSPF operates in both point-to-point and broadcast multi-access networks - The importance of Network Security Concepts	- Can a link-state routing protocol be used in a multi-area network? - How can we mitigate vulnerabilities, threats, and exploits to enhance network security?

Evidence of Learning (Assessments)

Students will be evaluated by - Hands-on lab activities and virtual learning tools are integrated into the curriculum. Both tools are designed to supplement classroom learning and provide an interactive "hands-on" experience in environments with limited physical equipment
- Interactive formative and summative assessments are integrated into the Cisco 2 curriculum and supported by an advanced online delivery system that presents assessment tasks, automatically scores and records results, and provides feedback to aid in learning.
- Immediate feedback supports instructor and student evaluation of acquired knowledge and skills. Assessments can be as simple as a multiple-choice question or as complex as troubleshooting a simulated network

Objectives (SLO)

Students will know:
- OSPF Features and Characteristics
- OSPF Packets
- OSPF Operation
- OSPF Router ID
- Point-to-Point OSPF Networks
- Multiaccess OSPF Networks
- Modify Single-Area OSPFv2
- Default Route Propagation
- Verify Single-Area OSPFv2
- Current State of Cybersecurity
- Threat Actors
- Threat Actor Tools
- Malware
- Common Network Attacks
- IP Vulnerabilities and Threats
- Network Security Best Practices

Students will be able to:
- Describe basic OSPF features and characteristics.
- Describe the OSPF packet types used in single-area OSPF.
- Explain how single-area OSPF operates.
- Configure an OSPFv2 router ID.
- Configure single-area OSPFv2 in a point-to-point network.
- Configure the OSPF interface priority to influence the DR/BDR election in a multiaccess network.
- Implement modifications to change the operation of single area OSPFv2.
- Configure OSPF to propagate a default route.
- Verify a single-area OSPFv2 implementation.
- Describe the current state of cybersecurity and vectors of data loss
- Describe the threat actors who exploit networks.
- Describe tools used by threat actors to exploit networks.
- Describe malware types.
- Describe common network attacks.
- Explain how IP vulnerabilities are exploited by threat actors.
- Describe best practices for protecting a network.

Suggested Resources/Technology Tools

- Cisco IOS versions
- Routers: Version 15.0 or higher, IP Base feature set
- Switches: Version 15.0 or higher, lanbaseK9 feature set
- Packet Tracer v7.3
- Open-source server software
- For various services and protocols, such as Telnet, SSH, HTTP, DHCP, FTP, TFTP, etc.
- Tera Term source SSH client software for lab PCs
- Oracle VirtualBox, most recent version
- Wireshark version 2.5 or higher

Tier 1 Modifications and Accommodations
Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans

Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to:
- Follow individual IEP/504 plans for specific modifications.
- Preferential seating
- Extended/Additional time for assessments
- Behavior management support
- Assignments/resources in electronic and physical format

- Break down assignments with oral directions, written directions, and visuals.
- Provide frequent reminders to stay on task and reinforce on-task behavior
- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students
- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:
- Allow the use of Google Translate where appropriate.
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
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- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:
- Complex, in-depth research assignments
- Independent study where applicable
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Career Readiness, Life Literacies, and Key Skills Practices (June 2020)

- ❏ Act as a responsible and contributing citizen and employee.
- ❏ Apply appropriate academic and technical skills.
- ❏ Attend to personal health and financial well being.
- ❏ Communicate clearly and effectively and with reason.
- ❏ Consider the environmental, social and economic impacts of decisions.

- ❏ Demonstrate creativity and innovation.
- ❏ Employ valid and reliable research strategies.
- ❏ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❏ Model integrity, ethical leadership, and effective management.
- ❏ Plan education and career paths aligned to personal goals.
- ❏ Use technology to enhance productivity.
- ❏ Work productively in teams while using cultural global competence.

Module 3
Network Security Concepts
Summary and Rationale
Explain how vulnerabilities, threats, and exploits can be mitigated to enhance network security. Network Security involves access control, virus and antivirus software, application security, network analytics, types of network-related security (endpoint, web, wireless), firewalls, VPN encryption and more.
Recommended Pacing
4 Weeks
Standards

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Pathway: Information Support & Services (IT-SUP)

9.3.IT-SUP.1	Provide technology support to maintain service.

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Engineering Design

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Instructional Focus

Enduring Understandings:	Essential Questions:
● Network security is the key to keeping that sensitive information safe, and as more private data is stored and shared on vulnerable devices, network security will only grow in importance and necessity.	● Why keep sensitive data safe from cyber attacks and ensure the network is usable and trustworthy?

Evidence of Learning (Assessments)

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Objectives (SLO)

Students will know:	Students will be able to:
● Current State of Cybersecurity ● Threat Actors ● Threat Actor Tools ● Malware ● Common Network Attacks ● IP Vulnerabilities and Threats ● TCP and UDP Vulnerabilities ● IP Services ● Network Security Best Practices ● Cryptography	● Describe the current state of cybersecurity and vectors of data loss. ● Describe the threat actors who exploit networks. ● Describe tools used by threat actors to exploit networks. ● Describe malware types. ● Describe common network attacks. ● Explain how IP vulnerabilities are exploited by threat actors.

- Explain how TCP and UDP vulnerabilities are exploited by threat actors.
- Explain how IP services are exploited by threat actors.
- Describe best practices for protecting a network.
- Describe common cryptographic processes used to protect data in transit.

Suggested Resources/Technology Tools

- Cisco IOS versions
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- Switches: Version 15.0 or higher, lanbaseK9 feature set
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- Open-source server software
- For various services and protocols, such as Telnet, SSH, HTTP, DHCP, FTP, TFTP, etc.
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Module 4-6

ACL Concepts ACLs for IPv4 Configuration NAT for IPv4

Summary and Rationale

Organizations can use access control lists (ACL) to secure data. One of the major reasons to use access control lists is to restrict unauthorized users from accessing business-sensitive information. It can also be used to control network traffic by limiting the number of users accessing files, systems, and information.

Recommended Pacing

4 Weeks

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Instructional Focus

Enduring Understandings:	Essential Questions:
- Named Access Control Lists (ACLs) make it easier to manage and modify router rules. They use descriptive names to identify specific rules, making it easier to troubleshoot network issues and improve network performance. - Network Address Translation (NAT) conserves IP addresses by enabling private IP networks using unregistered IP addresses to go online. Before NAT forwards packets between the networks it connects, it translates the private internal network addresses into legal, globally unique addresses.	- What differentiates an ACL? - What is NAT?

Evidence of Learning (Assessments)

Students will be evaluated by - Hands-on lab activities and virtual learning tools are integrated into the curriculum. Both tools are designed to supplement classroom learning and provide an interactive "hands-on" experience in environments with limited physical equipment

Objectives (SLO)

Students will know:
- Purpose of ACLs
- Wildcard Masks in ACLs
- Guidelines for ACL Creation
- Types of IPv4 ACLs
- Configure Standard IPv4 ACLs
- Modify IPv4 ACLs
- Secure VTY Ports with a Standard IPv4 ACL

Students will be able to:
- Explain how ACLs filter traffic
- Explain how ACLs use wildcard masks
- Explain how to create ACLs
- Compare standard and extended IPv4 ACLs
- Configure standard IPv4 ACLs to filter traffic to meet networking requirements

- Configure Extended IPv4 ACLs
- NAT Characteristics
- Types of NAT
- NAT Advantages
- Configure Static NAT
- Configure Dynamic NAT
- Configure PAT
- NAT64

- Use sequence numbers to edit existing standard IPv4 ACLs
- Configure a standard ACL to secure vty access
- Configure extended IPv4 ACLs to filter traffic according to networking requirements
- Explain the purpose and function of NAT
- Explain the operation of different types of NAT
- Describe the advantages and disadvantages of NAT
- Configure static NAT using the CLI
- Configure dynamic NAT using the CLI
- Configure PAT using the CLI
- Describe NAT for IPv6

Suggested Resources/Technology Tools

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- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students
- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:
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- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:
- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
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Career Readiness, Life Literacies, and Key Skills Practices (June 2020)

- ❏ Act as a responsible and contributing citizen and employee.
- ❏ Apply appropriate academic and technical skills.
- ❏ Attend to personal health and financial well being.
- ❏ Communicate clearly and effectively and with reason.
- ❏ Consider the environmental, social and economic impacts of decisions.
- ❏ Demonstrate creativity and innovation.
- ❏ Employ valid and reliable research strategies.
- ❏ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❏ Model integrity, ethical leadership, and effective management.
- ❏ Plan education and career paths aligned to personal goals.
- ❏ Use technology to enhance productivity.
- ❏ Work productively in teams while using cultural global competence.

Module 7 - 8

WAN Concepts VPN & IPsec Concepts

Summary and Rationale

A wide-area network (WAN) is the technology that connects your offices, data centers, cloud applications, and cloud storage together. It is called a wide-area network because it spans beyond a single building or large campus to include multiple locations spread across a specific geographic area, or even the world.

Recommended Pacing

4 Weeks

Standards

9.3 Career and Technical Education (Link)

Career Cluster: Information Technology (IT)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.

Pathway: Information Support & Services (IT-SUP)

9.3.IT-SUP.1	Provide technology support to maintain service.
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.

NJSLS: Computer Science & Design Thinking (2020) (Link)

Computing Systems

8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.
8.1.12.CS.2	Model interactions between application software, system software, and hardware.

Engineering Design

8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.

NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)

9.2 Career Awareness, Exploration, Preparation, and Training

9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.

9.4 Life Literacies and Key Skills

9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

Instructional Focus

Enduring Understandings:	Essential Questions:
● There are two types of WAN: Switched WAN and Point-to-Point WAN. WAN is difficult to design and maintain. Similar to a MAN, the fault tolerance of a WAN is less and there is more congestion in the network. A Communication medium used for WAN is PSTN or Satellite Link.	● Why are wide-area networks (WAN) the technology that connects your offices, data centers, cloud applications, and cloud storage together?

Evidence of Learning (Assessments)

Students will be evaluated by - Hands-on lab activities and virtual learning tools are integrated into the curriculum. Both tools are designed to supplement classroom learning and provide an interactive "hands-on" experience in environments with limited physical equipment

Objectives (SLO)

Students will know:	Students will be able to:
● Purpose of WANs ● WAN Operations ● Traditional WAN Connectivity ● Modern WAN Connectivity ● Internet-Based Connectivity ● VPN Technology ● Types of VPNs ● IPsec	● Explain the purpose of a WAN ● Explain how WANs operate ● Compare traditional WAN connectivity options ● Compare modern WAN connectivity options ● Compare internet-based WAN connectivity options ● Explain how VPNs and IPsec secure site-to-site and remote access connectivity ● Describe benefits of VPN technology ● Describe different types of VPNs

	● Explain how the IPsec framework is used to secure network traffic

- Cisco IOS versions
- Routers: Version 15.0 or higher, IP Base feature set
- Switches: Version 15.0 or higher, lanbaseK9 feature set
- Packet Tracer v7.3
- Open-source server software
- For various services and protocols, such as Telnet, SSH, HTTP, DHCP, FTP, TFTP, etc.
- Tera Term source SSH client software for lab PCs
- Oracle VirtualBox, most recent version
- Wireshark version 2.5 or higher

Tier 1 Modifications and Accommodations
Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans

Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to:
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Module 9-10
QoS Concepts Network Management
Summary and Rationale
QoS (Quality of Service) is particularly important to guarantee the high performance of critical applications that require high bandwidth for real-time traffic. For example, it helps businesses to prioritize the performance of "inelastic" applications that often have minimum bandwidth requirements, maximum latency limits, and high sensitivity to jitter and latency, such as VoIP and videoconferencing.
Recommended Pacing
4 Weeks
Standards

9.3 Career and Technical Education (Link)

Career Cluster: Information Technology (IT)

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9.3.IT.5	Explain the implications of IT on business development.
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9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.

Pathway: Information Support & Services (IT-SUP)

9.3.IT-SUP.1	Provide technology support to maintain service.
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.

NJSLS: Computer Science & Design Thinking (2020) (Link)

Computing Systems

8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.
8.1.12.CS.2	Model interactions between application software, system software, and hardware.

Engineering Design

8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.

NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)

9.2 Career Awareness, Exploration, Preparation, and Training

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9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

Instructional Focus

Enduring Understandings:	Essential Questions:
- Quality of service (QoS) is the use of mechanisms or technologies that work on a network to control traffic and ensure the performance of critical applications with limited network capacity. It enables organizations to adjust their overall network traffic by prioritizing specific high-performance applications. - QoS networking technology works by marking packets to identify service types, then configuring routers to create separate virtual queues for each application, based on their priority. As a result, bandwidth is reserved for critical applications or websites that have been assigned priority access.	- How does QoS work? - Why is QoS important to priority access on a website?

Evidence of Learning (Assessments)

Students will be evaluated by - Hands-on lab activities and virtual learning tools are integrated into the curriculum. Both tools are designed to supplement classroom learning and provide an interactive "hands-on" experience in environments with limited physical equipment.

Objectives (SLO)

Students will know:
- Network Transmission Quality
- Traffic Characteristics
- Queuing Algorithms
- QoS Models
- QoS Implementation Techniques
- Device Discovery with CDP
- Device Discovery with LLDP
- NTP
- SNMP
- Syslog
- Router and Switch File Maintenance
- IOS Image Management

Students will be able to:
- Explain how network transmission characteristics impact quality
- Describe minimum network requirements for voice, video, and data traffic
- Describe the queuing algorithms used by networking devices
- Describe the different QoS models
- Explain how QoS uses mechanisms to ensure transmission quality
- Use CDP to map a network topology
- Use LLDP to map a network topology
- Implement NTP between an NTP client and NTP server
- Explain SNMP operation
- Explain syslog operation
- Use commands to back up and restore an IOS configuration file
- Perform an upgrade of an IOS system image

Suggested Resources/Technology Tools

- Cisco IOS versions
- Routers: Version 15.0 or higher, IP Base feature set
- Switches: Version 15.0 or higher, lanbaseK9 feature set
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- For various services and protocols, such as Telnet, SSH, HTTP, DHCP, FTP, TFTP, etc.
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Module 11
Network Design
Summary and Rationale
As networks become mission-critical for business functions, design decisions made by IT professionals can have far-reaching implications. A network with a well-planned design will perform better. It will be more secure and resilient and easier to troubleshoot, and it will scale easily and adapt to future technologies.
Recommended Pacing
4 Weeks
Standards

9.3 Career and Technical Education (Link)

Career Cluster: Information Technology (IT)

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Pathway: Information Support & Services (IT-SUP)

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Instructional Focus

Enduring Understandings:	**Essential Questions:**
- Whereas network design encompasses business processes and results, network topology refers to the design as viewed through network diagrams, often called topology maps. Ring, chain, tree, and mesh are a few types of network topology. - A network diagram is typically the workhorse of the design process. It provides a visual representation of the network and integrates information such as physical connections; quantity, type, and location of all devices and endpoints; IP addressing; and security processes and architecture. Network design software can help by creating a site or office plan to map physical connections. - When building a network from scratch, the first step is to assemble a list of all the assets, endpoints, users, devices, LANs, and other network elements. IT teams enter this information in the network design application to create the first iteration of a network diagram. - When designing for existing network environments, the process integrates existing infrastructure that must be maintained or kept running during production and deployment of the new network. Existing use patterns and workflows can inform the new network hierarchies and topologies, which will evolve	- What is the process for creating network design? - Why are network diagrams an integral part of the design process for network architecture? - What are the steps used to build a network from scratch? - When designing or redesigning an existing network, what are the elements that must be maintained to keep the network running, what are the patterns and practices that inform the new network hierarchies and topologies?

as security, product, and user experience
teams collaborate on the design.

Evidence of Learning (Assessments)

Students will be evaluated by - Hands-on lab activities and virtual learning tools are integrated into the curriculum. Both tools are designed to supplement classroom learning and provide an interactive "hands-on" experience in environments with limited physical equipment

Objectives (SLO)

Students will know:
- Hierarchical Networks
- Scalable Networks
- Switch Hardware
- Router Hardware

Students will be able to:
- Explain the characteristics of scalable network architectures
- Explain how data, voice, and video are converged in a switched network
- Explain considerations for designing a scalable network
- Explain how switch hardware features support network requirements
- Describe the types of routers available for small to medium sized business networks

Suggested Resources/Technology Tools

- Cisco IOS versions
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- Switches: Version 15.0 or higher, lanbaseK9 feature set
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- For various services and protocols, such as Telnet, SSH, HTTP, DHCP, FTP, TFTP, etc.
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- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:
- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
- Lead demonstrations for class
- Individual presentation

Career Readiness, Life Literacies, and Key Skills Practices (June 2020)

- ❏ Act as a responsible and contributing citizen and employee.
- ❏ Apply appropriate academic and technical skills.
- ❏ Attend to personal health and financial well being.
- ❏ Communicate clearly and effectively and with reason.
- ❏ Consider the environmental, social and economic impacts of decisions.
- ❏ Demonstrate creativity and innovation.

- ❏ Employ valid and reliable research strategies.
- ❏ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❏ Model integrity, ethical leadership, and effective management.
- ❏ Plan education and career paths aligned to personal goals.
- ❏ Use technology to enhance productivity.
- ❏ Work productively in teams while using cultural global competence.

Module 12
Network Troubleshooting
Summary and Rationale
Troubleshooting enterprise networks involves the systematic identification and resolution of issues that impact the functionality, performance, or security of the network infrastructure. This process aims to minimize downtime, ensure optimal performance, and enhance the overall reliability of the network. Effective troubleshooting requires a combination of technical expertise, analytical skills, and a structured approach to isolate and address problems. Common issues include connectivity issues, bandwidth constraints, hardware failures, configuration errors, and security vulnerabilities.   Enterprise networks serve as the backbone of organizational operations. Downtime can lead to significant financial losses and disrupt critical business processes. Troubleshooting is essential to quickly identify and rectify issues, minimizing the impact on daily operations.
Recommended Pacing
4 Weeks
Standards
9.3 Career and Technical Education (Link)
Career Cluster: Information Technology (IT)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.

9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.

Pathway: Information Support & Services (IT-SUP)

9.3.IT-SUP.1	Provide technology support to maintain service.
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.

NJSLS: Computer Science & Design Thinking (2020) (Link)

Computing Systems

8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.
8.1.12.CS.2	Model interactions between application software, system software, and hardware.

Engineering Design

8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.

NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)

9.2 Career Awareness, Exploration, Preparation, and Training

9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.

9.4 Life Literacies and Key Skills

9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

Instructional Focus

Enduring Understandings:	Essential Questions:
● Grasping fundamental principles and practices that help identify, analyze, and resolve issues within a computer network.	● How can troubleshooting be effectively employed to identify, address, and prevent network issues, ensuring the optimal performance, reliability, security, resource utilization, user experience, and compliance of the network infrastructure?

Evidence of Learning (Assessments)

Students will be evaluated by - Hands-on lab activities and virtual learning tools are integrated into the curriculum. Both tools are designed to supplement classroom learning and provide an interactive "hands-on" experience in environments with limited physical equipment.

Objectives (SLO)

Students will know:	Students will be able to:
● Network Documentation ● Troubleshooting Process ● Troubleshooting Tools ● Symptoms and Causes of ● Network Problems ● Troubleshooting IP Connectivity	● Troubleshoot enterprise networks ● Explain how network documentation is developed and used to troubleshoot network issues ● Compare troubleshooting methods that use a systematic, layered approach ● Describe different networking troubleshooting tools ● Determine the symptoms and causes of network problems using a layered model ● Troubleshoot a network using the layered model

Suggested Resources/Technology Tools

- Cisco IOS versions
- Routers: Version 15.0 or higher, IP Base feature set
- Switches: Version 15.0 or higher, lanbaseK9 feature set
- Packet Tracer v7.3
- Open-source server software
- For various services and protocols, such as Telnet, SSH, HTTP, DHCP, FTP, TFTP, etc.
- Tera Term source SSH client software for lab PCs
- Oracle VirtualBox, most recent version
- Wireshark version 2.5 or higher

Tier 1 Modifications and Accommodations
Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans

Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to:
- Follow individual IEP/504 plans for specific modifications.
- Preferential seating
- Extended/Additional time for assessments
- Behavior management support
- Assignments/resources in electronic and physical format
- Break down assignments with oral directions, written directions, and visuals.
- Provide frequent reminders to stay on task and reinforce on-task behavior
- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students
- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:
- Allow the use of Google Translate where appropriate.
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions

- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
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- ❏ Apply appropriate academic and technical skills.
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- ❏ Employ valid and reliable research strategies.
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- ❏ Model integrity, ethical leadership, and effective management.
- ❏ Plan education and career paths aligned to personal goals.
- ❏ Use technology to enhance productivity.
- ❏ Work productively in teams while using cultural global competence.

Module 13
Network Virtualization
Summary and Rationale
Network virtualization is a technology that enables the creation of virtualized and abstracted network resources, independent of the underlying physical network infrastructure. It involves decoupling the network functionality and services from the physical hardware, allowing for more flexibility, scalability, and efficient utilization of resources. In a virtualized network, multiple virtual networks can coexist on the same physical infrastructure, each operating as if it were a standalone entity. The rationale for network virtualization lies in its transformative potential to optimize resources, enhance scalability, improve security, increase flexibility, reduce costs, facilitate rapid deployment, support disaster recovery, streamline testing and development, enable centralized management, and promote technology agnosticism in network environments.
Recommended Pacing
4 Weeks
Standards

9.3 Career and Technical Education (Link)

Career Cluster: Information Technology (IT)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.

Pathway: Information Support & Services (IT-SUP)	
9.3.IT-SUP.1	Provide technology support to maintain service.
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.

NJSLS: Computer Science & Design Thinking (2020) (Link)	
Computing Systems	
8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.
8.1.12.CS.2	Model interactions between application software, system software, and hardware.
Engineering Design	
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.

NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)	
9.2 Career Awareness, Exploration, Preparation, and Training	
9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
9.4 Life Literacies and Key Skills	

9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
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9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

Instructional Focus

Enduring Understandings:	Essential Questions:
● Network virtualization encompasses the persistent and fundamental principles that define the concept and its ongoing impact on networking.	● How can network virtualization be strategically implemented and managed to optimize resource utilization, enhance scalability, improve security, and foster adaptability in response to evolving technological landscapes?

Evidence of Learning (Assessments)

Students will be evaluated by - Hands-on lab activities and virtual learning tools are integrated into the curriculum. Both tools are designed to supplement classroom learning and provide an interactive "hands-on" experience in environments with limited physical equipment

Objectives (SLO)

Students will know:	Students will be able to:
● Cloud Computing ● Virtualization ● Virtual Network ● Infrastructure ● Software-Defined ● Networking ● Controllers	● Explain the purpose and characteristics of network virtualization ● Explain the importance of cloud computing ● Explain the importance of virtualization ● Describe the virtualization of network devices and services ● Describe software-defined networking ● Describe controllers used in network programming

Suggested Resources/Technology Tools

- Cisco IOS versions
- Routers: Version 15.0 or higher, IP Base feature set
- Switches: Version 15.0 or higher, lanbaseK9 feature set
- Packet Tracer v7.3
- Open-source server software
- For various services and protocols, such as Telnet, SSH, HTTP, DHCP, FTP, TFTP, etc.
- Tera Term source SSH client software for lab PCs
- Oracle VirtualBox, most recent version
- Wireshark version 2.5 or higher

Tier 1 Modifications and Accommodations
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- Provide visual supports
- Partnering/Grouping of students
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- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
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- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:
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- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions

- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
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- ❏ Use technology to enhance productivity.
- ❏ Work productively in teams while using cultural global competence.

Module 14
Network Automation
Summary and Rationale

Network automation refers to the use of automated processes and tools to manage and control computer networks. It involves the use of scripting, programming, and other technologies to perform tasks such as configuration, provisioning, management, and troubleshooting of network devices.

Overall, network automation enhances efficiency, reduces human errors, accelerates deployment, and improves the overall agility and responsiveness of an organization's network infrastructure. It plays a critical role in modern IT environments, especially as organizations embrace technologies like cloud computing and software-defined networking (SDN).

Recommended Pacing

7-8 Weeks

Standards

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Career Cluster: Information Technology (IT)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
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9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.

Pathway: Information Support & Services (IT-SUP)	
9.3.IT-SUP.1	Provide technology support to maintain service.
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
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Computing Systems	
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NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)	
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Instructional Focus

Enduring Understandings:	Essential Questions:
● Network automation is rooted in its transformative impact on how networks are conceptualized, deployed, and managed. It's not just a tool or a set of technologies but a paradigm shift that empowers organizations to navigate the complexities of the digital landscape with greater efficiency, resilience, and innovation.	● Why is network automation essential for organizations and IT professionals to stay competitive, improve operational efficiency, enhance security, and adapt to the dynamic and evolving nature of modern networks?

Evidence of Learning (Assessments)

Students will be evaluated by - Hands-on lab activities and virtual learning tools are integrated into the curriculum. Both tools are designed to supplement classroom learning and provide an interactive "hands-on" experience in environments with limited physical equipment

Objectives (SLO)

Students will know:	Students will be able to:
● Automation Overview ● Data Formats ● APIs ● REST ● Configuration ● Management	● Explain how network automation is enabled through RESTful APIs and configuration management tools ● Describe automation ● Compare JSON, YAML, and XML data formats

● IBN and Cisco DNA ● Center	● Explain how APIs enable computer to computer communications ● Explain how REST enables computer to computer communications ● Compare the configuration management tools Puppet, Chef, Ansible, and SaltStack ● Explain how Cisco DNA center enables intent-based networking

Suggested Resources/Technology Tools

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