

# CIST 2453 - Enterprise Networking, Security, and Automation ( version 202014L )

## Course Title                      Course Development      Learning Support

Enterprise Networking, Security, and Automation                      Standard                      No

## Course Description

This course describes the architectures and considerations related to designing, securing, operating, and troubleshooting enterprise networks. Major topics are wide area network (WAN) technologies and quality of service (QoS) mechanisms used for secure remote access. The course also introduces software-defined networking, virtualization, and automation concepts that support the digitalization of networks. Students gain skills to configure and troubleshoot enterprise networks, and learn to identify and protect against cybersecurity threats. They are introduced to network management tools and learn key concepts of software-defined networking, including controller-based architectures and how application programming interfaces (APIs) enable network automation.

## Pre-requisites

Pre-requisites: All Required

CIST 2452 - Cisco Routing and Switching Essentials ( 201512L )

## Regstr. Co-requisites

Regstr. Co-requisites: None

## True Co-requisites

True Co-requisites: None

## Course Length

	Lecture Contact Time	Regular Lab Type	Reg. Lab Contact Time	Other Lab Type	Oth. Lab Contact Time	Total Contact Hrs
Contact Hours Per Week	2 hrs	Lab	4 hrs	N/A	0 hrs	6 hrs
Contact Min/Hrs Per Semester	1500 min		3000 min		0 min	90 hrs
	Lecture Credit Hours	Lab Credit Hours	Total Credit hours	WLU		
Semester Credit Hours	2	2	4	142.5		

## Competencies & Outcomes

### Order Description

#### 1      Single-Area OSPFv2 Concepts

Order	Description	Learning Domain	Level of Learning
1	Explain how single-area OSPF operates in both point-to-point and broadcast multiaccess networks.	Cognitive	Comprehension
2	Describe basic OSPF features and characteristics.	Cognitive	Knowledge
3	Describe the OSPF packet types used in single-area OSPF.	Cognitive	Comprehension
4	Explain how single-area OSPF operates.	Cognitive	Comprehension

#### 2      Single-Area OSPFv2 Configuration

Order	Description	Learning Domain	Level of Learning
1	Implement single-area OSPFv2 in both point-to-point and broadcast multiaccess networks.	Psychomotor	Complex Response
2	Configure an OSPFv2 router ID.	Psychomotor	Guided Response
3	Configure single-area OSPFv2 in a point-to-point network.	Psychomotor	Guided Response
4	Configure the OSPF interface priority to influence the DR/BDR election in a multiaccess network.	Psychomotor	Guided Response
5	Implement modifications to change the operation of single-area OSPFv2.	Psychomotor	Guided Response
7	Configure OSPF to propagate a default route.	Psychomotor	Guided Response
8	Verify a single-area OSPFv2 implementation.	Psychomotor	Complex Response

### 3 Network Security Concepts

Order	Description	Learning Domain	Level of Learning
1	Explain how vulnerabilities, threats, and exploits can be mitigated to enhance network security.	Cognitive	Comprehension
3	Describe the current state of cybersecurity and vectors of data loss.	Cognitive	Knowledge
4	Describe the threat actors who exploit networks.	Cognitive	Knowledge
5	Describe tools used by threat actors to exploit networks.	Cognitive	Knowledge
7	Describe malware types.	Cognitive	Knowledge
8	Describe common network attacks.	Cognitive	Knowledge
9	Explain how IP vulnerabilities are exploited by threat actors.	Cognitive	Comprehension
10	Explain how TCP and UDP vulnerabilities are exploited by threat actors.	Cognitive	Comprehension
11	Explain how IP services are exploited by threat actors.	Cognitive	Comprehension
12	Describe best practices for protecting a network	Cognitive	Knowledge
13	Describe common cryptographic processes used to protect data in transit.	Cognitive	Knowledge

### 4 ACL Concepts

Order	Description	Learning Domain	Level of Learning
1	Explain how ACLs are used as part of a network security policy.	Cognitive	Comprehension
3	Explain how ACLs filter traffic.	Cognitive	Comprehension
4	Explain how ACLs use wildcard masks.	Cognitive	Comprehension

5	Explain how to create ACLs.	Cognitive	Comprehension
6	Compare standard and extended IPv4 ACLs.	Cognitive	Analysis

## 5 ACLs for IPv4 Configuration

Order	Description	Learning Domain	Level of Learning
1	Implement IPv4 ACLs to filter traffic and secure administrative access.	Psychomotor	Complex Response
2	Configure standard IPv4 ACLs to filter traffic to meet networking requirements.	Psychomotor	Guided Response
3	Use sequence numbers to edit existing standard IPv4 ACLs.	Psychomotor	Guided Response
4	Configure a standard ACL to secure vty access.	Psychomotor	Guided Response
5	Configure extended IPv4 ACLs to filter traffic according to networking requirements.	Psychomotor	Guided Response

## 6 NAT for IPv4

Order	Description	Learning Domain	Level of Learning
1	Configure NAT services on the edge router to provide IPv4 address scalability.	Psychomotor	Complex Response
2	Explain the purpose and function of NAT.	Cognitive	Comprehension
3	Explain the operation of different types of NAT.	Cognitive	Comprehension
4	Describe the advantages and disadvantages of NAT.	Cognitive	Analysis
5	Configure static NAT using the CLI.	Psychomotor	Guided Response
6	Configure dynamic NAT using the CLI.	Psychomotor	Guided Response
7	Configure PAT using the CLI.	Psychomotor	Guided Response
8	Describe NAT for IPv6.	Cognitive	Knowledge

## 7 WAN Concepts

Order	Description	Learning Domain	Level of Learning
1	Explain how WAN access technologies can be used to satisfy business requirements.	Cognitive	Comprehension
2	Explain the purpose of a WAN.	Cognitive	Comprehension
3	Explain how WANs operate.	Cognitive	Comprehension
4	Compare traditional WAN connectivity options.	Cognitive	Analysis
5	Compare modern WAN connectivity options.	Cognitive	Analysis

6 Compare internet-based WAN connectivity options.

Cognitive

Analysis

## 8 VPN and IPsec Concepts

Order	Description	Learning Domain	Level of Learning
1	Explain how VPNs and IPsec secure site-to-site and remote access connectivity.	Cognitive	Comprehension
3	Describe benefits of VPN technology.	Cognitive	Knowledge
4	Describe different types of VPNs	Cognitive	Knowledge
5	Explain how the IPsec framework is used to secure network traffic.	Cognitive	Comprehension

## 9 QoS Concepts

Order	Description	Learning Domain	Level of Learning
1	Explain how networking devices implement QoS.	Cognitive	Comprehension
3	Explain how network transmission characteristics impact quality.	Cognitive	Comprehension
4	Describe minimum network requirements for voice, video, and data traffic.	Cognitive	Knowledge
5	Describe the queuing algorithms used by networking devices.	Cognitive	Knowledge
6	Describe the different QoS models	Cognitive	Knowledge
7	Explain how QoS uses mechanisms to ensure transmission quality.	Cognitive	Comprehension

## 10 Network Management

Order	Description	Learning Domain	Level of Learning
1	Implement protocols to manage the network.	Psychomotor	Complex Response
2	Use CDP to map a network topology.	Psychomotor	Guided Response
3	Use LLDP to map a network topology	Psychomotor	Guided Response
4	Implement NTP between an NTP client and NTP server.	Psychomotor	Guided Response
5	Explain SNMP operation	Cognitive	Knowledge
6	Explain syslog operation.	Cognitive	Knowledge
7	Use commands to back up and restore an IOS configuration file.	Psychomotor	Complex Response
9	Perform an upgrade of an IOS system image.	Psychomotor	Complex Response

## 11 Network Design

Order	Description	Learning Domain	Level of Learning
1	Explain the characteristics of scalable network architectures.	Cognitive	Comprehension
2	Explain how data, voice, and video are converged in a switched network.	Cognitive	Comprehension
3	Explain considerations for designing a scalable network.	Cognitive	Comprehension
4	Explain how switch hardware features support network requirements.	Cognitive	Comprehension
5	Describe the types of routers available for small to-mediumsized business networks.	Cognitive	Knowledge

## 12 Network Troubleshooting

Order	Description	Learning Domain	Level of Learning
1	Troubleshoot enterprise networks.	Psychomotor	Complex Response
2	Explain how network documentation is developed and used to troubleshoot network issues.	Cognitive	Comprehension
3	Compare troubleshooting methods that use a systematic, layered approach.	Cognitive	Analysis
4	Describe different networking troubleshooting tools.	Cognitive	Knowledge
5	Determine the symptoms and causes of network problems using a layered model.	Cognitive	Evaluation
6	Troubleshoot a network using the layered model.	Psychomotor	Complex Response

## 13 Network Virtualization

Order	Description	Learning Domain	Level of Learning
1	Explain the purpose and characteristics of network virtualization.	Cognitive	Comprehension
2	Explain the importance of cloud computing.	Cognitive	Comprehension
3	Explain the importance of virtualization.	Cognitive	Comprehension
4	Describe the virtualization of network devices and services.	Cognitive	Knowledge
5	Describe software-defined networking.	Cognitive	Knowledge
6	Describe controllers used in network programming.	Cognitive	Knowledge

## 14 Network Automation

Order	Description	Learning Domain	Level of Learning
-------	-------------	-----------------	-------------------

2	Explain how network automation is enabled through RESTful APIs and configuration management tools.	Cognitive	Comprehension
4	Describe automation.	Cognitive	Knowledge
5	Compare JSON, YAML, and XML data formats.	Cognitive	Analysis
6	Explain how APIs enable computer to computer communications.	Cognitive	Comprehension
7	Explain how REST enables computer to computer communications.	Cognitive	Comprehension
8	Compare the configuration management tools Puppet, Chef, Ansible, and SaltStack	Cognitive	Analysis
9	Explain how Cisco DNA center enables intent-based networking.	Cognitive	Comprehension