Miami Dade College

Course Description

CTS1651 | CCNA 2: Routing and Switching | 4.00 credits

This is the second course of the four-course Cisco curriculum that will prepare the student for professional certification as a Cisco Certified Network Associate (CCNA). Students will learn the architecture, components and operation of routers and switches, LAN (Local Area Networks) switch protocols and operations, VLANs (Virtual Local Area Networks), network routing protocols and concepts, static and dynamic routing, router and switch configuration and troubleshooting, and IP Address services. Prerequisite: CTS1650.

Course Competencies:

Competency 1: The student will demonstrate an understanding of switched network concepts and design by:

1. Identifying the elements of a converged network.
2. Describing the principles and benefits of a hierarchical network design.
3. Identifying the layers and functions of a switched network architecture.
4. Explaining frame forwarding and switching domains.
5. Explaining the uses and operations of Virtual Local Area Networks (VLANs).
6. Identifying and describing switching protocols and technologies.
7. Analyzing and searching business requirements, researching and recommending a LAN structure to meet those requirements.
8. Describing security issues and quality-of-service (QOS) considerations

Competency 2: The student will demonstrate switch configuration skills by:

1. Describing the function, features and operation of Cisco switches.
2. Performing and verifying switch configuration tasks, including boot environment, remote access management (telnet and passwords), banners, and Network Time Protocol (NTP).
3. Creating, configuring, and verifying virtual interfaces on a switch.
4. Configuring switch port interfaces, including duplex, speed, MDIX, modes, and trucking.
5. Implementing and managing switch security, including SSH, port-security configuration, security violation modes, MAC filtering, and messages.
6. Configuring and troubleshooting trunk formation on switches, including Dynamic Trucking Protocol (DTP), encapsulation type, and trunk mode.
7. Troubleshooting switch operations and host configurations.

Competency 3: The student will demonstrate an understanding of Virtual Local Area Networks (VLANs) by:

1. Describing the benefits and operation of VLAN in a Network.
2. identifying the different types and encapsulations of VLANs.
3. Explaining how VLANs segment a network and how switches handle VLAN traffic.
4. creating, managing, changing, and deleting VLANs on a switch and assigning VLANs to different switch interfaces.
5. configuring and managing VLAN trunks and Dynamic Trucking Protocol (DTP).
6. Troubleshooting VLANs, trunks, and DTP.

Competency 4: The student will demonstrate an understanding of routing concepts by:

1. Demonstrating a router's purpose, features, and operation, routing tables, and the route lookup process.
2. configuring and verifying IPv4 and IPv6 Addresses on router interfaces.
3. Describe how a router makes a path determination and switches a packet to the next device.
4. Analyzing routing tables to determine the routes to directly connected and destination networks.
5. Configure and verify static and default routes on a router.

Competency 5: The student will demonstrate an understanding of Inter-VLAN routing by:

1. Describing Inter-VLAN routing operations and methods.
2. configuring and verifying legacy Inter-VLAN routing.
3. configuring and verifying router-on-a-stick Inter-VLAN routing.
4. optimizing and troubleshooting Inter-VLAN routing operations.
5. Configuring, verifying, and troubleshooting Layer 3 switching using switched virtual interfaces.

Competency 6: The student will demonstrate an understanding of Dynamic Routing Protocols by:

1. Describing the types, features and operation of dynamic routing protocols.
2. Explaining the differences between the various dynamic routing protocols and their different versions.
3. Configuring, verifying, and troubleshooting RIP and RIP routing protocols on a router.
4. Configuring, verifying, and troubleshooting single-area OSPF (Open Shortest Path First) routing protocols on a router.

Competency 7: The student will demonstrate an understanding of network access control and security by:

1. Describing the purpose, features, and operation of Access Control Lists (ACLs).
2. Explain the difference between standard and extended ACLs and the guidelines for creating and locating each type.
3. Calculating and matching IP Addresses and wildcard masks to ACL statements.
4. Configuring and verifying the installation of ACLs on routers, including standard, extended, IPv4, IPv6, named, and advanced ACLs.
5. Troubleshooting and monitoring ACLs and security processes in a network environment.

Competency 8: The student will demonstrate an understanding of Dynamic Host Configuration Protocol (DHCP) Services by:

1. Describing the purpose, features and operation of DHCP.
2. configuring and verifying DHCP services on servers and clients.
3. configuring and verifying Stateless Address Autoconfiguration (SLAAC) and IPv6 DHCP Services.
4. Configuring DHCP relay and debugging and troubleshooting DHCP.

Competency 9: The student will demonstrate an understanding of Network Address Translation (NAT) Services by:

1. Describing the purpose, features and operation of static and dynamic NAT, and Port Address Translation (PAT).
2. Configuring and verifying NAT, PAT, port forwarding, and DHCP relay on Routers.
3. Configuring and verifying IPv6 DHCP Services.
4. Bugging and troubleshooting DHCP issues.

Competency 10: The student will demonstrate an understanding of network services, support, and troubleshooting by:

1. Performing network performance testing and documentation.
2. Describing effective troubleshooting strategies and techniques to resolve basic hardware, software, and configuration problems.
3. Identify standard routing and switching issues and describe recommended practices to provide high availability and access to routers and switches.
4. Implementing restoration of critical resources on a local area network.
5. Documenting problems and solutions for future reference.

Learning Outcomes:

1. Critical Thinking
2. Numbers / Data
3. Computer / Technology