Discipline: Computer Information Systems

Originator: James Cregg

RIVERSIDE COMMUNITY COLLEGE DISTRICT
INTEGRATED COURSE OUTLINE OF RECORD

COMPUTER INFORMATION SYSTEMS 26B

CIS-26B : Cisco Networking Academy 1B

College: RIV
Lecture Hours: 72.000
Units: 4.00
Pass/No Pass
Letter Grade

Course Description

Prerequisite: CIS-26A

Course Credit Recommendation: Degree Credit

The architecture, components, and operations of routers and switches in a small network. Students learn how to configure a router and a switch for basic functionality. By the end of this course students will be able to configure and troubleshoot routers and switches and resolve common issues with static route, RIPv2, virtual LANs, NAT, ACL, DHCP, inter-VLAN routing in both IPv4 and IPv6 networks, and perform device discovery, management, and maintenance. This course is 2nd of four Cisco-related curricula designed to prepare students for Cisco Certified Network Technician (CCNT), and Cisco Certified Network Associate (CCNA) certification examination. 72 hours lecture. (Letter Grade, or Pass/No Pass option.)

Short Description for Class Schedule

Cisco Networking Academy: Routing and Switching Essentials (RSE) covers the architecture, components, and operations of routers and switches in a small network. Students learn how to configure routers and switches in a small to medium-sized business network. Students will understand how a router forwards traffic, explain how switch VLANs operate, use monitoring tools, configure initial settings on network devices, setup static routing, and network address translation.

Entrance Skills:

Before entering the course, students should be able to demonstrate the following skills:

1. **Show proficiency in IP Addressing, routing fundamentals, and subnets.**
   - **CIS-26A** - Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks.

2. **Understand the different networking media.**
   - **CIS-26A** - Describe and differentiate the devices and services used to support communications in data networks and the Internet.

3. **Show proficiency in networking fundamentals and terminology.**
   - **CIS-26A** - Explain fundamental Ethernet concepts such as media, services, and operations.

4. **Demonstrate making a network cable (straight through and crossover).**
   - **CIS-26A** - Build a simple Ethernet network using routers and switches.

5. **Demonstrate the principles and structure of IP (Internet Protocol) addressing and the fundamentals of Ethernet.**
   - **CIS-26A** - Describe and differentiate the devices and services used to support communications in data networks and the Internet.

6. **Understand cabling LAN's and WAN's**
   - **CIS-26A** - Build a simple Ethernet network using routers and switches.

Course Objectives:

Upon successful completion of the course, students should be able to demonstrate the following activities:

1. Determine how a router will forward traffic based on the contents of the routing table.
2. Explain how switching operates in a small to medium-sized business network.
3. Use monitoring tools and network management protocols to troubleshoot data networks.
4. Configure initial settings on a network device.
5. Configure Ethernet switch ports.
6. Implement VLANs, static routing, network address translation (NAT) and access control lists (ACLs) to

filter traffic.

Student Learning Outcomes:
Upon successful completion of the course, students should be able to demonstrate the following skills:

1. **Describe basic switching concepts, how VLANs create logically separate networks, and how inter-VLAN routing utilize tagging to communicate.**
2. **Configure and troubleshoot basic operations of a small switched network, VLANs, and inter-VLAN routing.**
3. **Understand and describe the purpose, nature, and operations of a router, routing tables, route lookup process, dynamic routing protocols, distance vector routing protocols, link-state routing protocols, types of access control lists (ACLs), and benefits of using Dynamic Host Configuration Protocol (DHCP), Domain Name System (DNS) for IPv4 and IPv6 Networks.**
4. **Configure basic operations of routers in a small routed network including, Routing Information Protocol (RIPv2), static routes, applying ACLs, and Network Address Translation (NAT) for IPv4/IPv6 networks.**
5. **Use monitoring tools and network management protocols to analyze and troubleshoot data networks.**

Course Content:

1. Routing Concepts
   a. Router initial configuration.
   b. Routing decisions.
   c. Router operation.
2. Static Routing
   a. Implement static routers.
   b. Configure static and default routes.
   c. Troubleshoot static and default route.
3. Dynamic Routing
   a. Dynamic routing protocols.
   b. RIPv2.
   c. The routing table.
4. Switched Networks
   a. LAN design.
   b. The switched environment.
   c. Switching domains.
5. Switch Configuration
   a. Basic switch configuration.
   b. Configure a switch with initial settings.
   c. Configure switch ports.
   d. Switch security.
   e. Switch remote access (SSH).
   f. Switch port security operation.
6. VNALs
   a. VLAN segmentation.
   b. VLANS in a multi-switched environment.
   c. VLAN trunks.
   d. Tagging Ethernet frames for VLAN identification. (802.1Q)
   e. Native VLAN Tagging.
   f. VLAN implementations.
   g. VLAN assignment.
   h. Troubleshoot VLANs and trunks.
   i. Inter-VLAN routing.
   j. Configure router-on-a stick.
7. Access Control Lists
   a. ACL operation, purpose, guidelines, and wildcard masks.
   b. Standard IPv4 ACLs.
   c. Configuring and Verifying Standard ACLs.
   d. Securing VTY ports with standard IPv4 ACLs.
   e. Troubleshooting ACL Configuration and Placement.
8. DHCP
   a. DHCP operation.
   b. Configuring a basic DHCPv4 server.
   c. Configure DHCPv4 client
   d. Configure DHCPv4 relay.
   e. Configure a wireless router as a DHCPv4 client.
   f. Troubleshoot DHCPv4.

g. DHCPv6 (SLAAC).
h. Configuring a router as stateless DHCPv6 server.
i. Configuring a router as statefull DHCPv6 server.
9. NAT for IPv4
   a. Nat operation, IPV4 private address space.
   b. Types of NAT (static, dynamic, port address translation).
   c. Configuring static, dynamic, PAT, and port forwarding.
   d. Configuring NAT Pool Overload and PAT.
   e. Troubleshooting NAT.
   f. Troubleshooting commands.
10. Device Discovery, Management, and Maintenance
   a. Device discovery withy CDP.
   b. Device management with syslog operation.
   c. Router and switch file maintenance.
   d. Backing up and restoring using TFTP.
   e. IOS image management.

Methods of Instruction:

Methods of instruction used to achieve student learning outcomes may include, but are not limited to, the following activities:

- Presentation of class lectures/discussions/demonstrations in order to clarify the principles of Routing protocols RIP/ICMP and IP addressing.
- Presentation of class lectures/discussions/demonstrations in order to model and explain the fundamental concepts of routing, managing Cisco IOS software, distance vector routing protocols, IGRP, and Access Control Lists (ACLs).
- Web-based/web-enhanced/online/distance learning tasks/activities such as using Netlab in order to reinforce understanding of concepts related Cisco routing fundamentals.
- Web-based/web-enhanced/online/distance learning tasks/activities such as Cisco testing, Netlab lab assignments, online curriculum, and online lab submissions in order for students to understand the principles of routing troubleshooting and access control lists.
- Online and hands on Laboratory activities and application assignments in order to address areas of improvement in the fundamental concepts of how ACL's provide security and control to a network.
- Projects in order to facilitate and demonstrate the acquisition of skills required to determine which wildcard mask should be used and the difference between standard ACLs and Extended ACLs.
- Collaborative projects/cooperative learning tasks in order to encourage students to develop and apply Cisco networking skills.

Methods of Evaluation:

Students will be evaluated for progress in and/or mastery of student learning outcomes using methods of evaluation which may include, but are not limited to, the following activities:

- Quizzes/examinations designed to measure students' degree of mastery of routing fundamentals.
- Exercises/lab projects designed to demonstrate the acquisition of Access Control List and interface placement.
- Lab projects and oral presentations combing the use of router configurations, static routing, using RIP, using IGRP and basic router troubleshooting.
- Computer laboratory assignments/projects designed to clarify students' individual router fluency strengths and areas of improvement.
- Collaborative projects designed to demonstrate successful understanding of routing configuration skills and team work skills.
- Final exam designed to evaluate students' overall achievement of course objectives in Cisco routing concepts and router configuration skills.

Sample Assignments:

Outside-of-Class Reading Assignments

- Students are required to read the Cisco Netacad Web site and the CCNA Exploration Routing Protocols and Concepts course booklet.

Outside-of-Class Writing Assignments

- Utilizing the concepts learned, students will write configurations files and implement Link-State and Distant Vector routing protocols. Students will also write configuration files to implement static routes and analyze the routing tables.

Other Outside-of-Class Assignments

- Students will be completing assignments outside of class utilizing Packet Tracer and Netlab. These assignments will consist of preset configuration requirements covering different router and switch networking scenarios.

Course Materials:

All materials used in this course will be periodically reviewed to ensure that they are appropriate for college level instruction. Possible texts include the following:

Empson, Scott. *Routing and Switching Essentials Companion Guide.* V6.0 Cisco Press, 2017.
Packet Tracer. Software. Version 7.0.0.0305. Cisco, Provided free with the course..

Codes/Dates:

CB05 MOV Transfer Status: N/A (not in college inventory) (D)
CB05 NOR Transfer Status: N/A (not in college inventory) (D)
CB05 RIV Transfer Status: Transfers to CSU Only (B)

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