COURSE INFORMATION FORM

DISCIPLINE: CSIS
COURSE TITLE: Routing and Switching Essentials CCNA 2

CR.HR. 4  LECT HR. 3  LAB HR. 2  CLIN/INTERN HR. 0  CLOCK HR. 0

CATALOG DESCRIPTION

This course describes 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 the course, students will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPv2, single-area and multi-area OSPF, virtual LANs and inter-VLAN routing in both IPv4 and IPv6 networks. Students complete hands-on labs, virtual labs and interactive media activities. These labs and other activities reinforce new concepts and allow students to model and analyze routing and switching processes that may be difficult to visualize or understand.

PREREQUISITES

CSIS 112

EXPECTED STUDENT OUTCOMES IN THE COURSE (ESO)

Upon completion of this course, the student will be able to:

1. Describe the purpose, nature and operations of a switch and a router.
2. Explain how VLANs create logically separate networks and how routing occurs between them.
3. Compare and contrast different distance vector routing protocols and link-state routing protocols.
4. Explain the operation of routing technologies in facilitating inter-network communications in a small to medium-sized business network.
5. Configure and troubleshoot static routing and default routing (RIP and RIPv2) to enable end-to-end connectivity.
6. Implement and troubleshoot EIGRP to enable end-to-end connectivity.
7. Configure and troubleshoot Open Shortest Path First (OSPF) to enable end-to-end connectivity.
8. Configure and troubleshoot standard and extended access control lists (ACLs) to filter IPv4 and IPv6.
9. Implement and troubleshoot Dynamic Host Configuration Protocol (DHCP) for IPv4 and IPv6 networks to automate IP addressing configuration for end devices.
10. Configure and troubleshoot Network Address Translation (NAT) services on the edge router to provide IPv4 address scalability.
11. Interpret device output to correct implementation issues affecting end-to-end connectivity.
12. Configure Ethernet switch ports to manage network access for end devices.
13. Analyze how VLANs segment broadcast domains in a small to medium-sized network.
14. Implement VLANs and configure routing between VLANs.
15. Design an IP addressing scheme to provide connectivity to end users.
GENERAL EDUCATION OUTCOMES (ESO)
Specify which general education outcomes, if any, are substantially addressed by the course. Numbers in parentheses identify the Expected Student Outcomes linked to the specific General Education Outcome.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>ESO</th>
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PROGRAM-LEVEL OUTCOMES

CAREER AND TECHNICAL EDUCATION PROGRAM OUTCOMES
Specify which Career and Technical program outcomes, if any, are substantially addressed by the course by completing the “Career and Technical Education template” to show the relationship between course and program outcomes to assessment measures.

The student will demonstrate:
1. the ability to use industry specific software and/or apply troubleshooting skills to solve problems. (5-15)
2. the ability to work effectively in a team environment. (1-15)

CLASS-LEVEL ASSESSMENT MEASURES
Student accomplishment of expected student outcomes may be assessed using the following measures. (Identify which measures are used to assess which outcomes.)

Classroom Discussion/Participation (1-15)
Assignments/Labs (1-15)
Written Exam (1-15)
Skills Exam (1-15)
Individual instructors may order this outline as fits the needs of their individual courses. In addition, they may place more emphasis on some areas than on others. What is assured is that this particular list is covered in the course. Other topics may be added to a course as the instructor sees fit, and as time and interest allow. An *asterisk can be used to mark an item as optional.

I. LAN Design
   A. Converged Networks
   B. Switched Networks
   C. Frame Forwarding
   D. Switching Domains

II. Basic Switching Concepts and Configuration
    A. Configure switch with initial settings
    B. Configure switch ports
    C. Security concerns in LANs
    D. Security best practices
    E. Switch port security

III. VLANS
     A. VLAN segmentation and VLANs in a multi-switched environment
     B. VLAN implementations
     C. VLAN trunks and Dynamic Trunking Protocol (DTP)
     D. VLAN security and design

IV. Routing Concepts
    A. Initial configuration of a router
    B. Routing decisions and path determination
    C. Router operation & routing table

V. Inter-VLAN Routing
    A. Inter-VLAN routing configuration
    B. IP addressing issues
    C. Layer 3 switching
    D. Troubleshoot layer 3 switching

VI. Static Routing
    A. Static routing implementation
    B. Configure IPv4 and IPv6 static and default routes
    C. Classful addressing, CIDR and VLSM
    D. Configure IPv4 and IPv6 summary routes and floating static routes
    E. Troubleshoot static and default routes
VII. Routing Dynamically
   A. Dynamic routing protocol operation
   B. Distance vector dynamic routing
   C. Configuring RIP and RIPng routing
   D. Link-state dynamic routing
   E. The routing table and route lookup process

VIII. Single-Area OSPF
   A. Characteristics of OSPF
   B. Configure single-area OSPFv2
   C. Configure single-area OSPFv3

IX. Access Control Lists
   A. IP ACL operation
   B. Standard IPv4 ACLs
   C. Extended IPv4 ACLs
   D. Common ACL errors
   E. IPv6 ACLs

X. DHCP
   A. Dynamic Host Configuration Protocol v4
   B. Dynamic Host Configuration Protocol v6

XI. Network Address Translation for IPv4
   A. NAT operation
   B. Configuring NAT
   C. Troubleshooting NAT