

DATE SUBMITTED 04/03/2010
DATE DICC APPROVED 8/23/10

CATALOG NO. CSIS 113
DATE LAST REVIEWED _____

COURSE INFORMATION FORM

DISCIPLINE CSIS
COURSE TITLE Routing Protocols and Concepts CCNA Exploration 2

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

CATALOG DESCRIPTION

This course describes the architecture, components, and operation of routers, and explains the principles of routing and routing protocols. Students analyze, configure, verify, and troubleshoot the primary routing protocols RIPv1, RIPv2, EIGRP, and OSPF. By the end of this course, students will be able to recognize and correct common routing issues and problems. Students complete a basic procedural lab, followed by basic configuration, implementation, and troubleshooting labs in each chapter. These labs and other activities reinforce new concepts, and allow students to model and analyze routing 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 router.
2. Explain the critical role routers play in enabling communications across multiple networks.
3. Describe the purpose and nature of routing tables.
4. Describe how a router determines a path and switches packets.
5. Explain the route lookup process and determine the path packets will take in a network.
6. Configure and verify basic operations for a newly-installed router.
7. Describe the purpose of static routes and the procedure for configuring them.
8. Configure and verify static and default routing.
9. Describe the role of dynamic routing protocols and place these protocols in the context of modern network design.
10. Describe how metrics are used by routing protocols and identify the metric types used by dynamic routing protocols.
11. Identify the characteristics of distance vector routing protocols.
12. Describe the network discovery process of distance vector routing protocols using Routing Information Protocol (RIP).
13. Describe the functions, characteristics, and operations of the RIPv1 protocol.
14. Compare and contrast classful and classless IP addressing.
15. Describe classful and classless routing behaviors in routed networks.
16. Design and implement a classless IP addressing scheme for a given network.
17. Describe the main features and operations of the Enhanced Interior Gateway Routing Protocol (EIGRP).
18. Use advanced configuration commands with routers implementing EIGRP and OSPF.
19. Describe the basic features and concepts of link-state routing protocols.
20. Describe the purpose, nature, and operations of the Open Shortest Path First (OSPF) Protocol.
21. Configure and verify basic RIPv1, RIPv2, single area OSPF, and EIGRP operations in a small routed network.
22. Use router show and debug commands to troubleshoot common errors that occur in small routed networks.

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.

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. (1 – 22)
2. the ability to work effectively in a team environment. (1 – 22)

CLASS-LEVEL ASSESSMENT MEASURES

Student accomplishment of expected student outcomes will be assessed using the following measures. (Identify which measures are used to assess which outcomes.)

Classroom Discussion/Participation (1-22)
Assignments/Labs (1-22)
Written exam (1-22)
Skills exam (1-22)

COURSE OUTLINE FORM**DISCIPLINE** CSIS**COURSE TITLE:** Routing Protocols and Concepts CCNA Exploration 2

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. Introduction to Routing and Packet Forwarding
 - A. Inside the Router
 - B. CLI Configuration and Addressing
 - C. Building the Routing Table
 - D. Path Determination and Switching Functions
- II. Static Routing
 - A. Routers and Network
 - B. Router Configuration Review
 - C. Exploring Directly Connected Networks
 - D. Static Routes with "Next Hop" Addresses
 - E. Static Routes with Exit Interfaces
- III. Introduction to Dynamic Routing Protocols
 - A. Introduction and Advantages
 - B. Classifying Dynamic Routing Protocols
 - C. Metrics
 - D. Administrative Distances
 - E. Routing Protocols and Subnetting Activities
- IV. Distance Vector Routing Protocols
 - A. Introduction to Distance Vector Routing Protocols
 - B. Network Discovery
 - C. Routing Table Maintenance
 - D. Routing Loops
- V. RIP version 1
 - A. RIPv1: Distance Vector, Classful Routing Protocol
 - B. Basic RIPv1 Configuration
 - C. Verification and Troubleshooting
 - D. Automatic Summarization
 - E. Default Route and RIPv1
- VI. VLSM and CIDR
 - A. Classful and Classless Addressing
 - B. VLSM
 - C. CIDR
 - D. VLSM and Route Summarization Activity

VII. RIPv2

- A. RIPv1 Limitations
- B. Configuring RIPv2
- C. VLSM and CIDR
- D. Verifying and Troubleshooting RIPv2

VIII. The Routing Table: A Closer Look

- A. The Routing Table Structure
- B. Routing Table Lookup Process
- C. Routing Behavior

IX. EIGRP

- A. Introduction to EIGRP
- B. Basic EIGRP Configuration
- C. EIGRP Metric Calculation
- D. DUAL
- E. More EIGRP Configurations

X. Link-State Routing Protocols

- A. Link-State Routing
- B. Implementing Link-State Routing Protocols

XI. OSPF

- A. Introduction to OSPF
- B. Basic OSPF Configuration
- C. The OSPF Metric
- D. OSPF and Multiaccess Networks
- E. More OSPF Configuration