

**CS 82.21B Course Outline as of Fall 2009****CATALOG INFORMATION**

Dept and Nbr: CS 82.21B Title: NETWORKING ROUTING

Full Title: Routing Protocols and Concepts (Cisco Networking 2)

Last Reviewed: 4/27/2015

Units	Course Hours per Week		Nbr of Weeks		Course Hours Total	
Maximum	4.00	Lecture Scheduled	4.00	17.5	Lecture Scheduled	70.00
Minimum	4.00	Lab Scheduled	0	8	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	4.00		Contact Total	70.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 140.00

Total Student Learning Hours: 210.00

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly: CIS 55.11B

**Catalog Description:**

This course, for the Information Technology (IT) professional, 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 (Routing Information Protocol version 1), RIPv2, EIGRP (Enhanced Interior Gateway Routing Protocol), and OSPF (Open Shortest Path First). Students will recognize and correct common routing issues and problems. Material is presented through a basic procedural labs, basic configuration, implementation, and troubleshooting labs. Network simulator activities reinforce new concepts, and allow students to model and analyze routing processes that may be difficult to visualize or understand.

**Prerequisites/Corequisites:**

Completion of CS 82.21A (formerly CIS 55.11A)

**Recommended Preparation:**

Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:****Schedule of Classes Information:**

Description: This course, for the Information Technology (IT) professional, 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 (Routing Information Protocol version 1), RIPv2, EIGRP (Enhanced Interior Gateway Routing Protocol), and OSPF (Open Shortest Path First). Students will recognize and correct common routing issues and problems. Material is presented through a basic procedural labs, basic configuration, implementation, and troubleshooting labs. Network simulator activities reinforce new concepts, and allow students to model and analyze routing processes that may be difficult to visualize or understand. (Grade or P/NP)

Prerequisites/Corequisites: Completion of CS 82.21A (formerly CIS 55.11A)

Recommended: Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>CSU Transfer:</b>	Transferable	Effective: Spring 2009	Inactive:
<b>UC Transfer:</b>		Effective:	Inactive:

**CID:**

**Certificate/Major Applicable:**

Not Certificate/Major Applicable

## **COURSE CONTENT**

**Outcomes and Objectives:**

Upon completion of this course, students will be able to:

1. Examine the purpose, nature, and operations of a router
2. Summarize the processes routers perform in enabling communications across multiple networks
3. Explain the purpose and nature of routing tables
4. Determine how a router selects a path and switches packets
5. Set up and verify router interfaces
6. Describe the purpose and procedure for configuring static routes
7. Evaluate the role of dynamic routing protocols in the context of network design
8. Differentiate between routing metrics and infer the metric types used by dynamic routing protocols
9. Summarize the characteristics of distance vector routing protocols
10. Describe the network discovery process of distance vector routing protocols using Routing Information Protocol (RIP)
11. Check the functions, characteristics, and operations of the RIPv1

protocol

12. Compare and contrast classful and classless IP addressing
13. Compare and contrast classful and classless network routing behaviors
14. Design and implement a classless IP addressing scheme for a given network
15. Validate comprehensive RIPv1 configurations
16. Test the basic RIPv2 configuration commands and evaluate RIPv2 classless routing updates
17. Summarize the main features and operations of the Enhanced Interior Gateway Routing Protocol (EIGRP)
18. Validate comprehensive EIGRP configurations
19. Summarize the basic features and concepts of link-state routing protocols
20. Contrast the purpose, nature, and operations of the Open Shortest Path First (OSPF) Protocol with distance vector routing protocols

## **Topics and Scope:**

Topics will include but not be limited to:

- I. Introduction to Routing and Packet Forwarding
  - A. Inside the router
  - B. Command Line Interface (CLI) configuration and addressing review
  - C. Introducing the routing table
  - D. Path determination and switching functions
  - E. Router configuration exercises
- II. Static Routes
  - A. Routers in networks
  - B. Static routes with "next hop" addresses
  - C. Summary and default static routes
  - D. Topology review
  - E. Managing and troubleshooting static routes
  - F. Static route configuration exercises
- III. Introduction to Dynamic Routing
  - A. Advantages
  - B. Classifying dynamic routing protocols
  - C. Routing domains, process IDs, and autonomous systems
  - D. Metrics
  - E. Routing protocol and subnetting exercises
- IV. Distance Vector Routing Protocol
  - A. Overview of distance vector routing protocols
  - B. Network discovery
  - C. Routing table maintenance
  - D. Routing loops
  - E. Distance vector routing protocols today
- V. Routing Information Protocol (RIP) v1
  - A. RIPv1: a distance vector, classful routing protocol
  - B. Basic RIPv1 configuration
  - C. Automatic summarization
  - D. Default route and RIPv1
  - E. Troubleshooting
  - F. RIPv1 configuration exercises
- VI. Classless Routing Protocols, VLSM and CIDR

- A. Internet Protocol (IP) addressing
  - B. Overview of IPv4 enhancements
  - C. Variable-length subnet masking (VLSM)
  - D. Classless interdomain routing (CIDR)
  - E. VLSM and classless routing exercises
- VII. RIPv2
- A. RIPv1 configuration and limitations
  - B. Configuring RIPv2
  - C. VLSM and CIDR with RIPv2
  - D. RIPv2 configuration exercises
- VIII. Routing Table: A Closer Look
- A. Routing table structure
  - B. Routing table lookup process
  - C. Classful and classless routing behavior
  - D. Equal cost load balancing
  - E. Routing table exercises
- IX. Enhanced Interior Gateway Routing Protocol (EIGRP)
- A. Basic EIGRP configuration
  - B. Features of EIGRP
    - 1. Establishing adjacencies
    - 2. Diffusing Update Algorithm (DUAL)
  - C. More EIGRP configurations
  - D. Verifying and troubleshooting EIGRP
  - E. EIGRP configuration exercises
- X. Link-State Routing Protocols
- A. Concept of link-state routing protocols
  - B. Link-state process
- XI. Open Shortest Path First (OSPF)
- A. Basic OSPF configuration
  - B. OSPF router ID
  - C. OSPF metric calculation
  - D. Establishing adjacencies
  - E. OSPF and multi-access networks
  - F. Verifying and troubleshooting OSPF
  - G. OSPF configuration exercises

**Assignment:**

Reading assignments may include:

1. Online research of network devices and deployment practices
2. Approximately 50 pages weekly from the textbook

Homework problems may include:

1. Hands-on exercises to demonstrate proficiency with each topic
2. Online quizzes
3. Creation of network design diagrams

Other assignments may include:

1. Objective examinations and quizzes
2. Skill demonstration examinations
3. Classroom scenario based exercises

## Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems, Creation of network design diagrams and layouts

Problem solving  
15 - 30%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Class performances, Performance exams, Network device configuration

Skill Demonstrations  
20 - 30%

**Exams:** All forms of formal testing, other than skill performance exams.

Multiple choice, True/false, Matching items, Completion, Simulated equipment configuration

Exams  
20 - 30%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Attendance and participation in scenario based exercises

Other Category  
10 - 25%

## Representative Textbooks and Materials:

Routing Protocols and Concepts CCNA Exploration Companion Guide (2nd). Graziani, Rick and Johnson, Allan. Cisco Press: 2008