

I. COURSE DESCRIPTION:

- A. Department Information:
Division: Business and Information Technology
Department: Computer Information Technology
Course ID: CIT 092
Course Title: Basic Routing Semester Two (Cisco Networking Academy)
Units: 3
Lecture: 2
Laboratory: 3
Prerequisite: CIT 091

Catalog Description:

This course is the second in a series of four semester courses designed to prepare the student to test for the Cisco Certified Network Associate (CCNA™) certification. CCNA certification indicates a foundation in and apprentice knowledge of networking for the small office/home office (SOHO) market. Topics covered include router fundamentals, router setup and configuration, network management, routing and routed protocols, and network troubleshooting. (Formerly MIS 091)

- B. Schedule Description:
Networking Fundamentals Semester Two (Cisco Networking Academy). Topics include: OSI, Routing, TCI/IP, Router Configuration and Troubleshooting. (Formerly MIS 091)

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

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

- A. describe in detail the OSI layers.
- B. differentiate between various LAN technologies, especially the varieties of Ethernet.
- C. build the semester 2 topology given routers, switches, cables, hubs, and transceivers.
- D. log into the router, use different router modes, use editing features and context-sensitive help.
- E. demonstrate the router show commands, router testing commands.
- F. perform tasks related to the TCP/IP protocol suite configuration of routers.
- G. configure a router using the setup command and dialog.
- H. flowchart the process for altering and saving the router configuration file.
- I. perform the password recovery procedure.
- J. diagram the ways a router can obtain an IOS image.
- K. demonstrate the ability to use the configuration register calculator.
- M. use the IOS commands relevant to loading and monitoring IOS images.
- N. create a complete CLI configuration template.
- O. complete CLI configuration of a router (with a completely erased configuration file) in 10 minutes or less.
- P. create a variety of diagrams to explain TCP in detail.
- Q. create a Class B network planning scheme.
- R. configure and verify static and default routes on a router.
- S. configure and verify the dynamic routing protocols RIP and IGRP on a router.
- T. working in teams, build and troubleshoot a complete 5-router topology.

IV. CONTENT

- A. The OSI Model
- 1. Layered network model
 - 2. The OSI model layer functions
 - 3. Peer-to-peer communications

4. Five steps of data encapsulation
 5. LAN devices and technologies
 6. Ethernet and IEEE 802.3 standards
 7. Carrier sense multiple access with collision detection
 8. Logical (IP) addressing
 9. MAC addressing
 10. TCP/IP environment
 11. Subnetworks
 12. Host Layer (the Upper 4 Layers of the OSI Model)
 13. Application, presentation and session layers
 14. Transport layer Transport layer functions
- B. WANS
1. WANS and devices
 2. WAN standards
 3. WAN technologies
 4. WANS and Routers
 5. Router Basics
 6. The function of a router in a WAN
 7. Semester 2 lab topology
- C. Router User Interface
1. User and privileged modes
 2. User mode command list
 3. Privileged-mode command list
 4. User router help functions
 5. Using IOS editing commands
 6. Using IOS command history
 7. Using the Router Interface and Interface Modes
 8. Lab: Router user interface
 9. Lab: Router user interface modes
- D. Router Components
1. External router configuration sources
 2. Internal router's configuration components
 3. RAM for working storage in the router
 4. Router modes
 5. Router Show Commands
 6. Examining router status by using router status commands
 7. The show running-configuration and show startup-configuration commands
 8. The show interfaces, show version and show protocols commands
 9. Lab: router show commands
 10. Routers Network Neighbors
 11. Gaining Access to other routers by using CISCO Discovery Protocols (CDP)
 12. Showing CDP neighbor entries
 13. A CDP configuration example
 14. Showing CDP entries for a device and CDP neighbors
 15. Lab: CDP Neighbors
 16. Basic Networking Testing
 17. Testing process that uses the OSI model
 18. Testing the application layer by using telnet
 19. Testing the network layer using the ping command
 20. Testing the network layer with the trace command
 21. Testing network layer with the show ip route command
 22. Using the show interfaces serial command to test the physical and data link layers
 23. The show interfaces and clear counters command
 24. Checking real-time traffic with debug

- 25. Troubleshooting tools challenge
- E. Router Boot Sequence and Setup Mode
 - 1. Router startup routine
 - 2. Router startup sequence
 - 3. Commands related to router startup
 - 4. System Configuration Dialog
 - 5. Using the setup command
 - 6. Setting up global parameters
 - 7. Setting up interface parameters
 - 8. Setting up script review and use
 - 9. Router Setup Lab
- F. Router Configuration Files
 - 1. Router configuration file information
 - 2. Working with Release 11.x configuration files
 - 3. Working with pre-Release 11.0 configuration files
 - 4. Using the copy running-config TFTP and copy TFTP running-configuration commands
 - 5. Describe using NVRAM with Release 11.x.
 - 6. Using NVRAM with Pre-11.0 IOS software
 - 7. Router Configuration Modes
 - 8. Using router configuration modes
 - 9. Global configuration modes
 - 10. Configuring routing protocols
 - 11. Interface configuration commands
 - 12. Configuring a specific interface
 - 13. Configuration Methods
 - 14. Password configuration methods
 - 15. Router identification configuration
 - 16. Configuration labs
 - 17. Cisco configmaker
 - 18. Router config. Web browser
- G. The Basics of IOS Versions
 - 1. Locating the Cisco IOS software
 - 2. Configuration register values
 - 3. The show version command
 - 4. Bootstrap Options in Software
 - 5. Boot system commands
 - 6. Preparing for the use of TFTP
 - 7. The show flash command
 - 8. IOS Naming and Software Image Backup
 - 9. Cisco's IOS naming conventions
 - 10. The copy flash TFTP command
 - 11. The show TFTP flash command
 - 12. How to load a software image backup
- H. Configuring a Route from the CLI after Start-up Config has been Erased
 - 1. Router configuration process
 - 2. Router password recovery procedure on 1700 and 2500 series routers.
 - 3. Router Configuration Lab
 - 4. Individual router config.
 - 5. The TCP/IOP Protocol Suite
 - 6. The Internet TCP/IP protocols and the OSI model
 - 7. TCP/IP protocol stack and the application layer
 - 8. TCP/IP protocol stack and the transport layer
 - 9. TCP and UDP segment format
 - 10. TCP and UDP port numbers

11. TCP three-way handshake/open connection
 12. TCP simple acknowledgment and windowing
 13. Layer 3 Concepts
 14. TCP/IP and the Internet Layer
 15. Diagram the IP datagram
 16. Internet Control Message Protocol (ICMP)
 17. How ARP works
- J. IP Addressing and Subnetting
1. The purpose of IP address
 2. The role of host address on a routed network
 3. The role of broadcast addresses on a routed network
 4. The assignment of router interface and network IP addresses
 5. The Role of DNS in Router configurations
 6. The IP address command
 7. The IP host command
 8. Describe the IP name-server command
 9. How to enable and disable DNS on a router
 10. Show hosts command
 11. Verifying Address Configuration
 12. Verification commands
 13. The telnet and ping commands
 14. The trace command
 15. Assigning New Subnet Numbers to the Topology
 16. Topology challenge lab

V. METHODS OF INSTRUCTION:

- A. Lecture
- B. Demonstration
- C. Multi-Media Presentations
- D. Computer-assisted instruction
- E. Class and Group Discussion of Significant Issues and Topics
- F. Group Activities

VI. TYPICAL ASSIGNMENTS:

- A. Lecture:
 1. Analyze the physical connections of an existing lab setup, document the cabling and connections between devices, and draw a diagram of the lab equipment setup.
- B. Demonstration
 1. Working in teams of two, demonstrate the recovery procedure when a password is forgotten.
- C. Computer Assisted Instruction:
 1. Utilize the Interactive Lab Activity to configure a router.
- D. Class and Group Discussion
 1. Presented with a lab configuration where communications in failing. Develop a list of potential causes and methods to test the network for those courses.
- E. Group Activities
 1. Record all of the interfaces (or port connectors) on the router and, any cable attached. Identify the cable type, connector, and the device attached to the other end. Create a table of the observations.

VIII. EVALUATION:

- A. Methods of Evaluation:

1. Problem Solving Exercises
 - a. Typical Exercise
 - i. Router A cannot telnet to Router E. Using proper troubleshooting techniques, discover and correct the problem.
 2. Skills Demonstration
 - a. Typical Demonstration
 - i. Correctly connect all cables and hardware to build the 5 router topology shown in a diagram.
 3. Objective Tests
 - a. Typical Question
 - i. What does it mean if your Cisco router command prompt is Router#?
 - a. You are in login mode;
 - b. You are in help mode
 - c. You are in user mode
 - d. You are in privileged mode
 4. Written Assignments
 - a. Typical Assignment
 - i. Maintain a log in your Engineering Journal of all Cisco IOS router commands you are exposed to throughout the Semester Two curriculum. Include required syntax along with a description of the command.
 5. Lab Activities
 - a. Typical Lab Activity
 - i. Make a console connection to the router and issue the “show cdp neighbors” command. Document the output of this command.
- B. Frequency of evaluation:
1. On-line module examinations as each module is completed; the software provides immediate feedback and review
 2. On-line final examination
 3. Skill-based final exam
 4. Group work evaluated a minimum of three times per semester
- C. Typical exam question
1. What information does testing a network using the “ping” command provide?

VII. TYPICAL TEXT(S)

Cisco Systems, Inc. Cisco Networking Academy Program, CCNA 1 & 2 Companion Guide, Third Edition Indianapolis, IN: Cisco Press, 2003.

Cisco Systems, Inc. Cisco Networking Academy Program, CCNA 1 & 2 Engineering Journal & Workbook, Third Edition Indianapolis, IN: Cisco Press, 2003.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: None