

I. COURSE DESCRIPTION:

- A. Department Information:
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| Division: | Computer Information Technology |
| Department: | Business & Information Technology |
| Course ID: | CIT 093 |
| Course Title: | Fundamentals of LANs, Local Area Networks, Semester Three (Cisco Networking Academy) |
| Units: | 3 |
| Lecture: | 2 hours |
| Laboratory: | 3 hours |
| Prerequisite: | CIT 092 (Cisco Semester Two) |
- B. Catalog Description:
This course is designed to provide students with classroom and laboratory experience in configuring routers and switches for various industry standard protocols, including segmentation of LAN's using bridges, routers, and switches; virtual LANs, Fast Ethernet, cut-through and store and forward LAN switching.
- C. Schedule Description
The third semester of the Cisco Academy provides students with classroom and laboratory experience in configuring routers and switches for various industry standard protocols. It includes, but is not limited to segmentation of LAN's using routers and switches; and virtual LANs, Fast Ethernet, cut-through and store and forward LAN switching.

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. work through a class B IP address planning example without notes or a calculator
- D. explain the process of routing
- E. demonstrate an understanding of the TCS Overview
- F. create simple HTML files
- G. explain half-duplex and full-duplex Ethernet, the basic operation of a switch, and segmentation of networks by bridges, switches, and routers
- H. describe VLANs and STP and perform simple hardware setup and software configuration of a switch
- I. explain the theory and benefits of VLANs
- J. configure basic VLANs on a VLAN-capable switch
- K. explain Layer 1, Layer 2, and Layer 3 network design
- L. create preliminary Layer 1, Layer 2, and Layer 3 LAN Design Choices and present a proposed IP addressing Scheme
- M. create physical topologies, site wiring diagrams, and logical topologies
- N. explain the operation and metrics of EIGRP
- O. migrate a router from RIP to EIGRP and completely configure EIGRP using appropriate IOS commands
- P. explain standard access lists and configure ACLs on a router for a variety of common permit/deny situations
- Q. explain extended access lists and configure extended ACLs on a router for a variety of common permit/deny situations
- R. configure an ACL for controlling Internet traffic

- S. explain some basic practices of network management

IV. CONTENT

- A. Review: The OSI Reference Model and Routing
 - 1. The OSI Reference Model and the Problems It Solves
 - 2. The Physical Layer of the OSI Reference Model
 - 3. The Data Link Layer of the OSI Reference Model
 - 4. Network Layer Functions
 - 5. Routing and the Different Classes of Routing Protocols
 - 6. The Transport Layer of the OSI Reference Model
- B. LAN Switching
 - 1. Various LAN Communication Problems
 - 2. Full-Duplex Transmitting, Fast Ethernet Standard and LAN Segmentation
 - 3. Switching and VLANs
 - 4. The Spanning-Tree Protocol
- C. VLANs
 - 1. VLANs
 - 2. Segmentation with Switching Architectures
 - 3. VLAN Implementation
 - 4. Benefits of VLANs
- D. LAN Design
 - 1. LAN Design Goals and Components
 - 2. Network Design Methodology
 - 3. Layer 1 Design
 - 4. Layer 2 Design
 - 5. Layer 3 Design
- E. Routing Protocols: EIGRP
 - 1. The Network Layer Basics
 - 2. Routed and Routing Protocols
 - 3. IP Routing Protocols
 - 4. EIGRP Operation
- F. ACLs
 - 1. Access Control Lists (ACLs)
 - 2. ACL Configuration Tasks
 - 3. Standard ACLs
 - 4. Extended ACLs
 - 5. Named ACLs
 - 6. Using ACLs with Protocols
 - 7. Placing ACLs
 - 7. Verifying ACLs
- H. Network Management
 - 1. Network Documentation
 - 2. Network Security
 - 3. Environmental Factors
 - 4. Network Performance
 - 5. Server Administration
 - 6. Network Troubleshooting

V. METHODS OF INSTRUCTION:

- A. Lecture
- B. Web-based Interactive Labs
- C. Demonstration
- D. Web-based Training

- E. Discussion
- F. Group Activity
- G. Computer Assisted Instruction

VI. TYPICAL ASSIGNMENTS:

- A. Critical thinking and performance
 - 1. Configure an Ethernet switch for IP and HTTP access.
 - 2. Using the curriculum's interactive flash capability, perform the step-by-step configuration problem presented.
- B. Skills demonstration
 - 1. In your engineering journal, record the commands used while you configure a switch with the Management Console User Interface Menus.
 - 2. Explain segmentation of networks by bridges, switches and routers.
- C. Written Assignment
 - 1. Construct a standard Access Control List to permit or deny specific traffic to pass through a router.
 - 2. In your engineering journal, explain extended access lists.

VII. EVALUATION:

- A. Methods of Evaluation:
 - 1. Problem Solving Exercises
 - a. A host is not able to ping its Ethernet switch. Examine the configuration of the host and the switch to determine and correct the problem.
 - b. Jim and Tom are asked to redesign Big Tin's network. Currently, the network consists of 14 routers with a potential growth of 3 routers in the next four months. Jim and Tom suggest the company implement RIP for internetwork routing. Is this the best possible solution for Big Tin Inc? Justify your answers.
 - 2. Skills Demonstration
 - a. Correctly configure the TCP/IP network settings of a workstation to be compatible with the switch IP address and the router interface to which it is connected.
 - b. Migrate a router from RIP to EIGRP and completely configure EIGRP using appropriate IOS commands.
 - 3. Objective Tests
 - a. What is a beneficial effect of adding a VLAN?
 - b. What is the purpose of Access lists?
 - 4. Written Assignments
 - a. Examine an Ethernet switch and record all pertinent information about the switch in a table.
 - b. In your engineering journal list and explain the at least three basic practices of network management.
 - 5. Lab Activities
 - a. Use a utility to determine the path that data travels through an Internetwork.
 - b. Using the diagram provided, create the network shown. Copy your configuration files to the TFTP server.
- B. Frequency of Evaluation:
 - 1. On-line module examinations as each module is completed; the software provides immediate feedback and review
 - 2. Group-work evaluated a minimum of two-times per semester
 - 3. Weekly Lab Activities
 - 4. Skill-based and online final examination

San Bernardino Valley College
Curriculum Approved: February 2, 2004
Last Updated: January 2004

VIII. TYPICAL TEXT(S)

Cisco Systems Inc. Cisco Networking Academy Program CCNA 3 & 4 Companion Guide, 3rd ed. Indianapolis, IN: Cisco Press, 2003.

Cisco Systems Inc. Cisco Networking Academy Program CCNA 3 & 4 Engineering Journal and Workbook, 3rd ed. Indianapolis, IN: Cisco Press, 2003.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: Zip Disk