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

I. CATALOG DESCRIPTION:
   A. Department Information:

Division:	Business and Information Technology
Department:	Computer Information Technology
Course ID:	CIT 096
Course Title:	Remote Access, Semester Six (Cisco Networking Academy)
Units:	3
Lecture:	2 Hours
Laboratory:	3 Hours
Prerequisite:	CIT 095

   B. Catalog and Schedule Description:
   Cisco Semester Six focuses on Remote Access to the network. The course will provide students with learning experiences in asynchronous dial-up, ISDN, DDR, X.25, Frame Relay, ODR, Wan backup, queuing, compression, NAT, and AAA. This is the second in a series of four courses recommended for CCNP (Cisco Certified Network Professional) certification.

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. Select Cisco Products for Remote Connections
   B. Assemble and Cable the WAN Components
   C. Configure Asynchronous Connections with Modems
   D. Access the Central Site with Windows 95
   E. Configure PPP and Controlling Network Access with PAP or CHAP
   F. Use ISDN and DDR to Enhance Remote Connectivity
   G. Optimize Use of DDR Interfaces
   H. Configure a Cisco 700 Series Router
   I. Establish a Dedicated Frame Relay Connection and Controlling Traffic Flow with Traffic Shaping
   J. Enable a Backup to the Permanent Connection
   K. Optimize Traffic on Dedicated WAN Connections
   L. Scale IP Addresses with PAT and NAT
   M. Troubleshoot the Remote Access Network

IV. CONTENT:
   A. Wide Area Network
      1. Remote Access
      2. Selecting Appropriate WAN Technologies
      3. Selecting CISCO Remote Access Solutions
      4. Assembling and Cabling WAN Components
      5. Case Studies
   B. Modems and Asynchronous Dialup Connections
      1. Modem Functions
      2. Configuring Asynchronous Interfaces and Terminal Lines
      3. Modem Configuration
      4. Configuring a Windows PC Dialup Connection
   C. PPP
      1. PPP Overview
      2. PPP Authentication
      3. PPP Callback
      4. PPP Compression
      5. PPP Multilink
      6. Verifying PPP Configuration
   D. ISDN and DDR

1. ISDN Architecture
2. ISDN Protocol Layers
3. Configuring ISDN BRI
4. Configuring Dial-On-Demand Routing (DDR)
5. Static and Default Routing
6. Optical Configurations
7. Verifying IDSN BRI Configurations
8. Configuring ISDN PRI

E. Dialer Profiles
   1. Legacy DDR
   2. Dialer Profiles

F. X.25
   1. X.25 Concepts
   2. Configuring X.25

G. Frame Relay
   1. Frame Relay Concepts
   2. Configuring Frame Relay
   3. Frame Relay Topologies

H. Managing Frame Relay Traffic
   1. Frame Relay Traffic Shaping
   2. On Demand Routing

I. WAN Backup
   1. Dial Backup
   2. Backup Interface Operations
   3. Routing with the Load Backup Feature
   4. Verifying Dial Backup Configuration

J. Queuing and Compression
   1. Queuing
   2. Queuing Options
   3. Optimizing Traffic Flow with Data Compression

K. Scaling IP Addresses with NAT
   1. NAT Overview
   2. Configuring NAT
   3. Verifying NAT Configuration
   4. NAT Considerations

L. Using AAA to Scaling Access Control
   1. AAA Overview
   2. Configuring AAA

M. Emerging Remote-Access Technologies
   1. Cable Modems
   2. Wireless Network Access
   3. Multichannel Multipoint Distribution Services
   4. Wireless Local Area Networking Line
   5. Digital Subscriber Line
   6. Very-High-Data-Rate Subscriber Line

N. Configuring a Cisco 700 Series Router
   1. Cisco 700 Series
   2. Configuring the Cisco 700 Series Router
   3. Cisco 700 and IOS Configuration Examples

V. METHODS OF INSTRUCTION:
   A. Lecture
   B. Web-Based Instruction
   C. Interactive Labs
   D. Demonstration
   E. Group Activity

VI. TYPICAL ASSIGNMENTS:
   A. Lecture
      1. Use the login local command to configure authentication and access levels.
      2. Use the exec-timeout command to control the amount of time before an idle Telnet or console session is terminated
   B. Web-Based Instruction and Demonstration
      1. Configure ISDN dial-on-demand bandwidth supporting overload traffic from the primary Frame Relay link
      2. Configure Network Address Translation (NAT) static translation to provide reliable outside access to three shared company servers
   C. Interactive Lab Group Activity
      1. Configure AAA authorization for a user with low-level access
      2. Configure SanJose1 to use Dial on Demand Routing over ISDN.

VII. EVALUATION(S):
   A. Methods of Evaluation:
      1. Typical exam questions:
         a. Which statement best describes Weighted Fair Queuing (WFQ)?
            1. The packets are dynamically sorted, and a precedence assigned so that each conversation gets it share of bandwidth
            2. An administrator predefines priorities and configures access lists to determine the quality of service for each type of conversation
            3. Traffic is classified according to various criteria and then assigned to one of four output queues: high, medium, normal, or low priority
            4. An incoming packet is compared with a preconfigured priority list to select a queue. If the queue is full, the packet is dropped.
         b. If the aaa authentication login A-LIST group tacacs+ command is applied to a terminal line, what will happen to users who attempt to authenticate and the TACACS+ server(s) return an error?
      2. Problem Solving and Skill Demonstration:
         a. Scenario: As the network engineer for the International Travel Agency, you are responsible for WAN connectivity. As ITA has grown, traffic has increased on your Frame Relay network. ITA partners, including airlines and hotel chains, have begun to complain about the speed of your web site. Also, file uploads, downloads, Web sessions, and database synchronizations time out on a regular basis. Though additional bandwidth has been ordered from the service provider, you have been directed to ensure partners and customers are not affected by bandwidth problems in the interim. If necessary, internal users will suffer during peak traffic times. After monitoring the network, you decide to allocate bandwidth, giving Voice over IP (VoIP) 40 percent, FTP 20 percent, and HTTP 20 percent, with all other traffic sharing the remaining 20 percent. Assignment: Build and configure the network as shown in the attached diagram with Frame Relay, Ethernet and IGRP with autonomous system number 234.
         b. The International Travel Agency (ITA) hired employees who will be working from their homes. IY+TA asked you to give these telecommuters access to the corporate network. Because the telecommuters do not need full-time access to network resources, you decide to implement dial-on-demand routing on Cisco 700 routers to connect to ITA's network.

You must configure the remote router to authenticate with CHAP. Finally, you need to configure the router to act as a DHCP server with a pool of 50 addresses.

B. Frequency of Evaluation
1. On-line chapter examinations as each chapter is completed; the software provides immediate feedback and review
2. Group-work activity evaluated a minimum of two-times per week
3. Weekly Lab Activities
4. Skill-based Final Examination

VIII. TYPICAL TEXT(S):
McGregor, Mark, CCNP Cisco Networking Academy Program: Remote Access Companion Guide, 1st Edition, Cisco Press, Indianapolis, Indiana: 2002

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: Zip Disk