

SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

SECTION I

SUBJECT AREA AND COURSE NUMBER

COMP 601

COURSE TITLE

INTRO TO ROUTER CONFIGURATION

ALTERNATE NAME

CISCO ACADEMY COURSE 2

TYPE COURSE

NON-FEE

VOCATIONAL

CATALOG COURSE DESCRIPTION

This course presents fundamentals in router and switch configuration and internetworking structure and theory, OSI model, IPv4 and IPv6 addressing, LAN/WAN topologies and architecture, Routed and Routing topologies, router modes, router components, routing protocols, router and switch setup, router and switch troubleshooting, Cisco IOS command and configuration, and TCP/IP. Students will learn through theory and hands on application. (FT)

LECTURE HOURS

40

LABORATORY HOURS

80

ADVISORIES

COMP 600 or equivalent.

RECOMMENDED SKILL LEVEL

10th grade reading level; ability to communicate effectively in the English language; knowledge of math concepts at the 10th grade level; basic computer literacy; normal color presentation and above average manual dexterity.

INSTITUTIONAL STUDENT LEARNING OUTCOMES

1. Social Responsibility
SDCE students demonstrate interpersonal skills by learning and working cooperatively in a diverse environment.
2. Effective Communication
SDCE students demonstrate effective communication skills.

INSTITUTIONAL STUDENT LEARNING OUTCOMES (CONTINUED)

3. Critical Thinking

SDCE students critically process information, make decisions, and solve problems independently or cooperatively.

4. Personal and Professional Development

SDCE students pursue short term and life-long learning goals, mastering necessary skills and using resource management and self advocacy skills to cope with changing situations in their lives.

COURSE GOALS

Provide instruction in the theory of operation, configuration and troubleshooting of routers and switches. Students will receive a more comprehensive knowledge of the OSI model and how data travels through each layer; LAN/WAN network topologies, Routed and Routing topologies, router and switch user modes, components and startup configurations, Cisco IOS command and configurations, TCP/IP, IP addressing, and routing protocols. This course will prepare the student to take exams like the CCNA Certification Exam (Cisco Certified Network Associate) and or the CCENT Certification Exam (Cisco Certified Entry Network Technician). Students will learn to show a spirit of cooperation and team work by completing assigned group tasks. Completion of these tasks will enhance the students' reading, writing, communication and mathematical competencies. Interpretation of technical terms used in networking and telecommunications technology, both verbal and written, is covered. Students who successfully complete this course will be prepared to move on to the next phase of networking training, which can include the Cisco Networking Academy in preparation to take the CCENT and or CCNA Certification Exam.

COURSE OBJECTIVES

Upon successful completion of this course, students will demonstrate through theory and practical application, problem solving, critical thinking, written and oral communication and mathematical ability and they are able to:

1. Demonstrate an in-depth knowledge of the functions of the seven layers of the OSI model.
2. Describe how data travels up and down the OSI model.
3. Describe the OSI model layer hardware and software.
4. Demonstrate common LAN topologies and protocols.
5. Configure IP and MAC addressing.
6. Describe TCP/IP.
7. Configure IPv4 and IPv6 addressing and subnetting.
8. Demonstrate IP addressing - Address configuration and Host Name Resolution.
9. Demonstrate a knowledge of common topologies and protocols.
10. Demonstrate and describe routed and routing topologies.
11. Demonstrate router and switch commands, components and startup configurations.
12. Demonstrate a knowledge of Cisco IOS commands and configurations.
13. Demonstrate a knowledge of routing protocols and troubleshooting techniques.
14. Configure Access Lists, including Standard, Extended and Name.

SECTION II

COURSE CONTENT AND SCOPE

1. OSI Reference Model
 - 1.1. Summary
 - 1.2. Enterprise development
 - 1.3. Why a layered network model
 - 1.4. Layer functions
 - 1.5. Peer-to-peer communication
 - 1.6. Data encapsulation
 - 1.7. Data encapsulation example
2. OSI Layers 1, 2, & 3 - Media Layers
 - 2.1. Common LAN technologies
 - 2.2. Ethernet /802.3
 - 2.3. Physical vs. logical addressing
 - 2.4. MAC addressing
 - 2.5. TCP/IP addressing
 - 2.6. Subnetting
3. OSI Layers 4, 5, 6, & 7
 - 3.1. Application layer
 - 3.2. Presentation layer
 - 3.3. Session layer
 - 3.4. Transport layer
 - 3.5. Segmenting upper - layer applications
 - 3.6. Establishing connections
 - 3.7. Flow control
 - 3.8. Windowing & reliability
 - 3.9. Acknowledgement
4. Local Area Networks
 - 4.1. Common technologies
 - 4.2. Networks and devices
 - 4.3. Topology overview
 - 4.4. The physical layers: LANS
 - 4.5. The data link layer protocols
5. Routed and Routing Technologies
 - 5.1. Path determination
 - 5.2. Routed vs. routing protocols
 - 5.3. Static vs. dynamic routes
 - 5.4. Time to convergence
 - 5.5. Distance vector concepts
 - 5.6. Distance vector - routing loops
 - 5.7. Counting to infinity
 - 5.8. Defining maximum
 - 5.9. Split horizon
 - 5.10. Hold-down timers
 - 5.11. Link state concepts

COURSE CONTENT AND SCOPE (CONTINUED)

- 5.12. LAN-to-LAN routing
- 5.13. LAN-to-WAN routing
- 5.14. Cisco router configuration
- 6. Using the Router - User Modes
 - 6.1. Logging into the router
 - 6.2. User-mode command list
 - 6.3. Privileged-mode command list
 - 6.4. Help functions
 - 6.5. Reviewing command history
- 7. Router and Switch Components
 - 7.1. Internal/external configuration
 - 7.2. Router and switch modes
 - 7.3. Router and switch status commands
 - 7.4. Cisco discovery protocol
 - 7.5. Ping operations
 - 7.6. Telnet operations
 - 7.7. IP routes
 - 7.8. Show interfaces
 - 7.9. Debug utility
- 8. Router and Switch Startup and Setup
 - 8.1. System startup
 - 8.2. Startup commands
 - 8.3. System configuration dialog
 - 8.4. Setup global parameters
 - 8.5. Setup interface parameters
 - 8.6. Switch Vlans configuration and implementation
- 9. Cisco IOS Command and Configuration Summary
 - 9.1. 11.x configuration files
 - 9.2. Using TFTP server
 - 9.3. NVRAM
 - 9.4. Router modes
 - 9.5. Configuration modes
 - 9.6. Interface modes
 - 9.7. Password configuration
- 10. Router Boot-up and IOS Upgrade Processes
 - 10.1. Registration values
 - 10.2. Bootstrap options
 - 10.3. Preparing TFTP
 - 10.4. Cisco IOS naming conventions
 - 10.5. Image backups
 - 10.6. Upgrade and restoration from network
- 11. TCP/IP - OSI Transport Layer
 - 11.1. Introduction to TCP/IP
 - 11.2. TCP segment format
 - 11.3. Port numbers
 - 11.4. Handshaking

COURSE CONTENT AND SCOPE (CONTINUED)

- 11.5. Acknowledgement
- 11.6. Sliding window
- 11.7. Network layer
- 11.8. Protocol field/IP datagram
- 11.9. ICMP testing
- 11.10. ARP
- 11.11. RARP
- 12. IP Addressing – Ipv4 and IPv6
 - 12.1. TCP/IP addressing
 - 12.2. Host addresses
 - 12.3. Broadcast addresses
 - 12.4. IP address configuration
 - 12.5. IP host name resolution
 - 12.6. Simple/extended ping
 - 12.7. IP trace
- 13. Routing Protocols and Packet Path Determination
 - 13.1. Initial router configuration
 - 13.2. Configuring IP routing (tables)
 - 13.3. Static/default routes
 - 13.4. Interior/exterior routing protocols
 - 13.5. Distance vector routing protocol configuration like RIP and EIGRP configuration
 - 13.6. Link state routing protocols including OSPF configuration
 - 13.7. Monitoring and troubleshooting
- 14. Access Control Lists
 - 14.1. Standard
 - 14.2. Extended
 - 14.3. Name
 - 14.4. DHCP (Dynamic Host Configuration Protocol)
 - 14.5. NAT (Network Address Translation)

APPROPRIATE READINGS

Appropriate readings may include, but are not limited to, periodicals, magazines, instructor-written materials, manuals, instructor selected URL's and other publications related to the design and implementation of networks.

WRITING ASSIGNMENTS

Appropriate writing assignments may include, but are not limited to, preparing text for an assigned project, keeping a journal on all laboratory and project work, completing all assigned reports, performing mathematic calculations as assigned, and completing all written assignments.

OUTSIDE ASSIGNMENTS

Outside assignments may include, but are not limited to, reading texts, reference resources or handouts; Internet sites, and research as needed to complete projects; and organizing and preparing written answers to assigned questions.

APPROPRIATE ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING

Assignments that demonstrate critical thinking may include, but are not limited to; analysis and evaluation of reading assigned text and online materials and utilize this analysis in classroom discussions, writing assignments, and in performing laboratory activities. Students must select and use appropriate methods and materials needed to complete laboratory assignments.

EVALUATION

A Student's grade will be based on multiple measures of performance. The assessment will measure development of independent critical thinking skills and will include evaluation of student's ability to:

1. Perform the manipulative skills of the craft, as required.
2. Apply theory to laboratory assignments.
3. Complete all online lessons.
4. Successfully complete all online exams.
5. Successfully complete the online final exam.
6. Successfully complete all assigned hands-on labs.
7. Perform on written, oral, or practical examinations.
8. Contribute to class discussions.
9. Maintain attendance per current policy.
10. Successfully complete group case study.

Satisfactory completion of the course requires completion of a culminating activity, which may include, but not limited to, one of the following:

1. Case study written report.
2. Classroom presentation.
3. Practical Lab projects, which include practical demonstrations of cable and router configurations, installation and troubleshooting.

Upon successful completion of each individual course a Certificate of Course Completion will be issued. Upon successful completion of all courses in the program a Certificate of Program Completion will be issued.

METHOD OF INSTRUCTION

Methods of instruction will include, but not limited to, lecture, online instruction, self-paced lab, demonstration, individualized study, use multimedia presentations, group/team work, tutorials, and other unique instruction requirements, such as, outside assignments, field trips, and guided student job assignments.

TEXTS AND SUPPLIES

Texts:

Cisco Network Academy CCNA2 Companion, current edition

URLs:

www.cisco.com
www.cisco.netacad.net

Supplies:

USB drive or personal storage device

PREPARED BY Carol L. Akey DATE August 2, 1999

REVISED BY Don Aragon and Maria Reyes DATE February 17, 2007

REVISED BY Instructional Services/SLO's Added DATE May 30, 2013

REVISED BY Richard Gholson/Don Aragon DATE March 2, 2014

REVISED BY Richard Gholson/Don Aragon DATE January 28, 2015

Instructors must meet all requirements stated in Policy 3100 (Student Rights, Responsibilities and Administrative Due Process), and the Attendance Policy set forth in the Continuing Education Catalog.

REFERENCES:

San Diego Community College District Policy 3100
California Community Colleges, Title 5, Section 55002
Continuing Education Catalog