

Discipline: Computer Information Systems

Originator: James Cregg

RIVERSIDE COMMUNITY COLLEGE DISTRICT INTEGRATED COURSE OUTLINE OF RECORD

COMPUTER INFORMATION SYSTEMS 26A

CIS-26A : Cisco Networking Academy 1A

College: RIV
Lecture Hours: 72.000
Units: 4.00
Pass/No Pass
Letter Grade

Course Description

Prerequisite: None

Advisory: CIS-1A, CIS-21, CSC-21 or CIS-23

Course Credit Recommendation: Degree Credit

This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The principles and structure of IP (Internet Protocol) addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for further study of computer networks. It uses the OSI (Open Systems Interconnection) and TCP (Transmission Control Protocol) layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. Preparation for the CompTIA Network+ certification exam. 72 hours lecture. (Letter Grade, or Pass/No Pass option)

Short Description for Class Schedule

Cisco Networking Academy: Network fundamentals, introduces the concept of network and provides an overview of the different types of networks. Examines the importance of roles or protocols for network communication, explores the OSI reference model, and TCP/IP communication using IPv4 and IPv6.

Entrance Skills:

Before entering the course, students should be able to demonstrate the following skills:

1. **Understand basic network communication and topology.**
2. **Understand basic computer hardware.**
 - o CIS-21 - Demonstrate how various operating systems interface with the network, user i/o, storage devices, and other hardware components.
3. **Show proficiency in file management and directory management.**
 - o CIS-1A - Solve common business problems using appropriate Information Technology applications and systems, such as word processors, spreadsheets, databases, presentation graphics, and the Internet.
4. **Be able to connect to the internet and navigate an on-line curriculum.**
 - o CIS-1A - Demonstrate the principles of Internet research.

Student Learning Outcomes:

Upon successful completion of the course, students should be able to demonstrate the following skills:

1. **Describe and differentiate the devices and services used to support communications in data networks and the Internet.**
 - o **Information Competency & Technology Literacy:** Students will be able to use technology to locate, organize, and evaluate information. They will be able to locate relevant information, judge the reliability of sources, and evaluate the evidence contained in those sources as they construct arguments, make decisions, and solve problems.
2. **Describe the role of protocol layers in data networks.**
 - o **Critical Thinking:** Students will be able to demonstrate higher-order thinking skills about issues, problems, and explanations for which multiple solutions are possible. Students will be able to explore problems and, where possible, solve them. Students will be able to develop, test, and evaluate rival hypotheses. Students will be able to construct sound arguments and evaluate the arguments of others.
3. **Evaluate the importance of addressing and naming schemes at various layers of data networks in**

IPv4 and IPv6 environments.

- **Information Competency & Technology Literacy:** Students will be able to use technology to locate, organize, and evaluate information. They will be able to locate relevant information, judge the reliability of sources, and evaluate the evidence contained in those sources as they construct arguments, make decisions, and solve problems.

4. Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks.

- **Communication Skills:** Students will be able to communicate effectively in diverse situations. They will be able to create, express, and interpret meaning in oral, visual, and written forms. They will also be able to demonstrate quantitative literacy and the ability to use graphical, symbolic, and numerical methods to analyze, organize, and interpret data.

5. Explain fundamental Ethernet concepts such as media, services, and operations.

- **Critical Thinking:** Students will be able to demonstrate higher-order thinking skills about issues, problems, and explanations for which multiple solutions are possible. Students will be able to explore problems and, where possible, solve them. Students will be able to develop, test, and evaluate rival hypotheses. Students will be able to construct sound arguments and evaluate the arguments of others.

6. Build a simple Ethernet network using routers and switches.

- **Information Competency & Technology Literacy:** Students will be able to use technology to locate, organize, and evaluate information. They will be able to locate relevant information, judge the reliability of sources, and evaluate the evidence contained in those sources as they construct arguments, make decisions, and solve problems.

7. Compose Cisco command-line interface (CLI) commands to perform basic router and switch configurations.

- **Critical Thinking:** Students will be able to demonstrate higher-order thinking skills about issues, problems, and explanations for which multiple solutions are possible. Students will be able to explore problems and, where possible, solve them. Students will be able to develop, test, and evaluate rival hypotheses. Students will be able to construct sound arguments and evaluate the arguments of others.

8. Experiment with common network utilities to verify small network operations and analyze data traffic.

- **Critical Thinking:** Students will be able to demonstrate higher-order thinking skills about issues, problems, and explanations for which multiple solutions are possible. Students will be able to explore problems and, where possible, solve them. Students will be able to develop, test, and evaluate rival hypotheses. Students will be able to construct sound arguments and evaluate the arguments of others.

Course Content:

1. OSI (Open Systems Interconnection)
 - a. How the layers prepares network packets for transmission.
 - b. Description of the encapsulation protocols and processes.
 - c. Network layer routing.
2. TCP/IP (Transmission Control Protocol/Internet Protocol) layered models.
 - a. Explore how TCP uses segmentation.
 - b. Differences between the OSI and TCP/IP model.
 - c. Functions included in the Internet layer.
3. IP addressing (IPv4).
 - a. Break down the different classes of IP addresses.
 - b. Subnetting IPv4 addresses.
 - c. Improve network performance by subnetting.
4. IP addressing (IPv6)
 - a. IPv6 Prefix length.
 - b. IPv6 Unicast addresses.
 - c. Link-local addresses.
 - d. Unique local addresses.
5. Routing.
 - a. Set password on VTY lines.
 - b. Set IP addresses on router interfaces.
 - c. Set the clock rate on serial interfaces.
6. Functions of common networking protocols.
 - a. How protocols allow communication to occur.
 - b. Functions of User Datagram protocol (UDP).
 - c. Acknowledgements to ensure delivery of IP packets.
7. DNS (Domain Name System).
 - a. Resolving a DNS name.
 - b. Hierarchical DNS servers.

8. Network troubleshooting methodology.
 - a. Using the OSI model in troubleshooting.
 - b. Protocol analysis of a small network.
9. Installation and configuration of routers and switches for a given scenario.
 - a. Implement VLAN's.
 - b. Set the management VLAN on switches.
 - c. Configure router interfaces
10. Installation and configuration of a wireless network for a given scenario.
 - a. Set passwords.
 - b. Set DHCP.
 - c. Set encryption to AES and security mode to WPA2 personal.
11. DHCP (Dynamic Host Configuration Protocol).
 - a. Set maximum number of users.
 - b. Change the client lease time.
12. Planning and implementation of a basic SOHO (Small Office/Home Office) network for a given set of requirements.
 - a. Network security and performance.
 - b. Developing IP and subnets maps.
13. Standard media types (for example: Fiber, Copper), associated properties, standard connector types.
14. Wireless standards.
 - a. WPA personal.
 - b. WPA enterprise.
 - c. Disable SSID Broadcast.
15. WAN (Wide Area Networks) technology types and properties.
 - a. ISDN.
 - b. DSL.
 - c. Frame Relay.
16. Network topologies.
 - a. Define star topologies.
 - b. Client server.
 - c. Ring topologies.
17. LAN (Local Area Networks) technology types and properties.
 - a. Logical map of the network.
 - b. Physical map of the network.
 - c. VLAN,s mapped to IP addresses.
18. Hardware and software tools to troubleshoot connectivity issues.
 - a. Extended ping.
 - b. Network baseline testing.
 - c. Protocol analyzer.
19. Network monitoring resources to analyze traffic.
 - a. Using WireShark to watch network performance.
 - b. Using Protocol Analyzer.
20. Network performance optimization.
 - a. Using VLAN's.
 - b. Providing file-sharing services.
 - c. Interpreting ping results.
21. Wireless Security Measures.
 - a. AES encryption.
 - b. WPA personal.
 - c. Disable SSID broadcast.
22. Network Access Security Methods.
 - a. Control VTY lines.
 - b. Control Telnet.
23. User authentication Methods.
 - a. Security on VTY lines.
 - b. Authentication using SSH.
 - c. Encryption of passwords.
24. Common threats, vulnerabilities, and mitigation techniques.
 - a. Firewalls.
 - b. Endpoint security.
 - c. Authentication, authorization, and accounting.

Methods of Instruction:

Methods of instruction used to achieve student learning outcomes may include, but are not limited to, the following activities:

- Presentation of class lectures/discussions/demonstrations in order to clarify the principles of TCP/IP protocol suite and IPv4 and IPv6 addressing.
- Presentation of class lectures/discussions/demonstrations in order to model and explain the fundamental concepts of routing, IP addressing IPv4 and IPv6, OSI model, cabling, and routing fundamentals.

- Web-based/web-enhanced/online/distance learning tasks/activities such as using Packet Tracer in order to reinforce understanding of concepts related Cisco networking fundamentals.
- Web-based/web-enhanced/online/distance learning tasks/activities such as Cisco testing NetAcad online curriculum, and online lab submissions in order for students to understand the principles of routing fundamentals.
- Online and Laboratory activities and application assignments in order to address areas of improvement in the fundamental concepts of Cisco networking to establish network communications.
- Projects in order to facilitate and demonstrate the acquisition of skills required to relate the OSI model to router and switch communications.
- Collaborative projects/cooperative learning tasks in order to encourage students to develop and apply networking skills.

Methods of Evaluation:

Students will be evaluated for progress in and/or mastery of student learning outcomes using methods of evaluation which may include, but are not limited to, the following activities:

- Hands-on-projects and a combination of examinations, presentations, discussions, or problem-solving assignments.
- Presentations of projects within specific modules.
- Testing of each module on the CISCO site.
- Written on-line assignments; these topics are called out in the CISCO curriculum.
- Class and individual projects such as an addressing scheme for a proposed local network.
- Laboratory projects/performance within Netlab, a locally hosted network simulator.
- Final examination/skills assessment administered on the CISCO site.

Sample Assignments:

Outside-of-Class Reading Assignments

- Students are required to read the Cisco Netacad Web site and the CCNA Routing and Switching Introduction to Networks Companion Guide booklet.

Outside-of-Class Writing Assignments

- Utilizing the concepts learned, students will write a paper clarifying the (OSI) Open System Interconnect model on how each layer is used and aligning protocols to each layer. Students will also write a list IP addresses used to subnet a class A, B, and C network.

Other Outside-of-Class Assignments

- Students will be completing assignments outside of class utilizing Packet Tracer, NetAcad, and Netlab. These assignments will consist of preset configuration requirements covering different router and switch networking scenarios.

Course Materials:

All materials used in this course will be periodically reviewed to ensure that they are appropriate for college level instruction. Possible texts include the following:

- Dye, M., Reid, A.. *Cisco Networking Academy Program: Introduction to Networks*. Version 1 Cisco Press, 2013.
- Empson, S.. *CCNA Routing and Switching Portable Command Guide*. 3rd Cisco Press, 2013.

Codes/Dates:

CB05 MOV Transfer Status: N/A (not in college inventory) (D)

CB05 NOR Transfer Status: N/A (not in college inventory) (D)

CB05 RIV Transfer Status: Transfers to CSU Only (B)

Board of Trustees Approval Date: 01/16/2016

COR Rev Date: 01/19/2016