

**I. COURSE DESCRIPTION:**

**A. Department Information:**

Division: Business and Information Technology  
Department: Computer Information Technology  
Course ID: CIT 091  
Course Title: Networking Fundamentals Semester I (Cisco Networking Academy)  
Units: 3  
Lecture: 2 Hours  
Laboratory: 3 Hours  
Departmental Advisory: MATH 952 and CIT 105

**B. Catalog and Schedule Description:**

This course is designed to provide students with classroom and laboratory experience in the fundamentals of current and emerging networking technology. Topics covered include network topology, cabling, electrical considerations, the OSI model, Internet Protocol addressing, bridges, switches, hubs, and routers. This is the first course in a four-course CCNA preparation sequence. (Formerly MIS 090)

**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. summarize purposes, rules, and regulations relative to computer networking.
- B. identify networking industry standards.
- C. visually identifies twisted pair, unshielded twisted pair, fiber optic cable, and coaxial cable.
- D. describe what is a Network Interface Card or NIC card, how it works, its purpose, where its located, and physical description.
- E. solve problems dealing with IP Version 4 subnets and subnet masking.
- F. compare and contrast signaling characteristics in fiber optic, coaxial and UTP media.
- G. identify routers, their purpose, and how router operations differ from bridges and switches.
- H. demonstrate how to make punch down connections, how to make jumper and patch cables using category 5 wiring and connectors, how to use simple testers to test cables, and how to use professional network diagnostic devices.
- I. explain and list the classes of LP version 4 network addresses, set up network and subnetwork addresses, list the OSI network model layers, compare and contrast a collision domain, and a broadcast domain.
- J. create a preliminary LAN design survey, and work in a group to set up simple a computer network.
- K. convert 8 bit numbers between binary, decimal, and hexadecimal numbering systems.
- L. give an IP version 4 address and subnet mask, determine the network address, usable host address range, and broadcast address.
- M. explain the differences between repeaters, bridges, switches, and routers identifying the OSI model layer of operation for each.
- N. examine a network diagram containing links, network devices, and host computers, and identify the broadcast and collision domains.
- O. identify a MAC frame and the field within it.
- P. identify an IP datagram and the fields within it.
- Q. demonstrate ability to locate Cisco technical documentation on the Internet.

**IV. CONTENT**

- A. Orientation to Skill Program
  - 1. Computer hardware basics

2. Computer software basics
3. The Binary number system
4. Basic networking terminology
5. Digital bandwidth
- B. The OSI Model
  1. Layers
  2. The OSI Model
  3. How the OSI Model compares with the TCP/IP Model
- C. Local Area Networks (LANs)
  1. Basic LAN devices
  2. The evolution of network devices
  3. The basics of data flow through LANs
- D. Electronic and Signals
  1. Electricity
  2. Digital multimeter
  3. Signals and noise in communication systems
  4. The encoding of networking signals
- E. Media Connections and Collisions
  1. The most common media
  2. Cable specifications and termination
  3. The process of making and testing cable
  4. Layer 1 components and devices
  5. Collisions and collision domains in shared layer environments
  6. The basic topologies used in networking
- F. Layer 2 Concepts
  1. LAN standards
  2. Hexadecimal numbers
  3. MAC addressing
  4. Framing
  5. Media Access Control (MAC)
- G. Layer 2 Technology
  1. IEEE 802.11 Wireless LANs
  2. The Fibers Optic LAN media and concepts
  3. The details of Ethernet IEEE 802.3, and high speed Ethernet implementations
  4. Layer 2 devices
  5. Effects of Layer 2 devices on data flow
  6. Basic Ethernet troubleshooting
- H. Design and Documentation
  1. Basic network design and documentation
  2. Wiring closet specifications
  3. Identifying potential wiring closets
  4. Selection practice
  5. Horizontal and backbone cabling
  6. Electricity and grounding
  7. Cabling and grounding
  8. A wiring plan for Ethernet star topology LAN
  9. Multiple earth ground problems
  10. Power line problems
  11. Surge suppressors and UPS functions
- I. Structured Cabling Project
  1. Project planning
  2. RJ-45 jack and outlet installation
  3. The basics of cable installation
  4. The installation of structured cable runs
  5. Stringing, running, and mounting cable

- 6. The basics of wiring closets and patch panels
- 7. The range of equipment and testing structured cabling projects
- J. Layer 3 Routing and Addressing
  - 1. Network layers
  - 2. Path determination
  - 3. The purpose and operation of IP addresses within the IP header
  - 4. IP address classes
  - 5. Reserved address space
  - 6. The basics of subnetting
  - 7. Creating a subnet
- K. Layer 3 Protocols
  - 1. Layer 3 devices
  - 2. Network-to-network communications
  - 3. Advanced ARP concepts
  - 4. Routable protocols
  - 5. Routing protocols
  - 6. Other network layer services
  - 7. ARP tables
  - 8. IGP and EGP
  - 9. Protocol analyzer software
- L. Layer 4 The Transport Layer
  - 1. The transport layer
  - 2. TCP and UDP
  - 3. TCP connection methods
- M. Layer 5 The Session Layer
  - 1. The basics of the session layer
- N. Layer 6 The Presentation Layer
  - 1. The basics of the presentation layer
- O. Layer 7 The Application Layer
  - 1. The basics of the application layer
  - 2. The domain name system
  - 3. Network applications
  - 4. Application layer examples

**V. METHODS OF INSTRUCTION:**

- A. Lecture
- B. Demonstration
- C. Multi-media
- D. Computer Assisted Instruction
- E. Class and Group Discussion of Significant Issues and Topics
- D. Group Activities

**VI. TYPICAL ASSIGNMENTS:**

- A. Lecture:
  - 1. Identify the basic computer network functions and terminology
- B. Demonstration:
  - 1. Demonstrate the different media included in the EIA/TIA 568 standards of backbone cabling
- C. Multi-media Presentations
  - 1. Review module on networking reference models, multi-media presentations. Be prepared to discuss and describe the functions of each of the seven layers of the OSI reference model.
- D. Computer Assisted Instruction:

1. Using the WWW, Identify the reasons why the industry uses a layered model.
- E. Class and Group Discussion:
  1. Describe connection-oriented network service and connectionless network service, and identify the key differences between them.
- F. Group Activities:
  1. Determine how the IP and MAC header for a data changes as it travels through a simple routed IP internetwork, given the IP and MAC addresses of all interfaces along the path.

## VII. EVALUATION:

- A. Methods of evaluation:
  1. Problem Solving Exercises
    - a. Typical Exercise
      1. Configure the network settings required to connect your PC to a local area network and to gain access to the Internet
  2. Skills Demonstration
    - a. Typical Demonstration
      1. Lisa overhears your conversation with Mark and asks your opinion about data encapsulation. She is confused about the layers in which encapsulation occurs. Explain the five steps of data encapsulation to her.
  3. Objective Tests
    - a. Typical Question
      1. Information transmitted on a network is called a(n) \_\_\_\_\_.
        - a. package
        - b. expresser
        - c. data destination
        - d. data packet
        - e. E-pack
  4. Written Assignments
    - a. Typical Assignment
      1. In your Journal, list ten (10) reasons for using the OSI model. How can detailed knowledge of the model be valuable for a network-support technician?
  5. Lab Activities
    - a. Typical Lab Activity
      1. Create a straight-through cable per the EIA/TIA 568B specifications shown in a figure; test the cable using a simple continuity tester.
  6. Presentations
    - a. Typical Presentation
      1. Perform typical troubleshooting steps required to determine why a host can not ping its default gateway.
- B. Frequency of evaluation:
  1. On-line examinations as each module is completed; the software provides immediate feedback and review.
  2. On-line final exam for course.
  3. Skill-based final exam.
  4. Group work evaluated a minimum of three times per course.

C. Typical exam questions

1. Which of the following addresses are on the same IP subnet as 192.168.16.99/28? (Choose three)

- |   |   |
|---|---|
| <input type="checkbox"/> 192.168.17.99  | <input type="checkbox"/> 192.168.16.9   |
| <input type="checkbox"/> 192.168.16.110 | <input type="checkbox"/> 192.168.16.97  |
| <input type="checkbox"/> 192.168.16.95  | <input type="checkbox"/> 192.168.16.108 |

2. The CAM of a switch is represented in the following table

	0809-B74C-3618	OCOO-4A21-7621
INT 1		
INT 2		X
INT 3	X	

If a frame with a destination address of OCOO-4A21-7621 and a source address of 0600-4B37-2322 is received, what will the switch do? (choose 2)

- |  |  |
|--|--|
| <input type="checkbox"/> discard the frame                   | <input type="checkbox"/> ARP to the router           |
| <input type="checkbox"/> enter the source address in the CAM | <input type="checkbox"/> forward the frame out INT 2 |
| <input type="checkbox"/> forward the frame out INT 3         |  |

VII. TYPICAL TEXT(S)

- A. Students will be utilizing the On-Line Cisco Academy Curriculum by Cisco, Inc.  
 B. Cisco Systems, Inc. Cisco Networking Academy Program, CCNA land 2 Companion Guide Third Edition. Indianapolis, IN: Cisco Press, 2003.  
 C. Cisco Systems, Inc. Cisco Networking Academy Program, CCNA 1 and 2 Engineering Journal & Workbook Third Edition. Indianapolis, IN: Cisco Press, 2003.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: Zip disk