

# EET-1303: CISCO I

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## Cuyahoga Community College

**Viewing: EET-1303 : Cisco I**

**Board of Trustees:**

November 2020

**Academic Term:**

Fall 2021

**Subject Code**

EET - Electrical/Electronic Engineer

**Course Number:**

1303

**Title:**

Cisco I

**Catalog Description:**

Introduction to the architectures, models, protocols, Ethernet fundamentals and networking elements that connect users, devices, applications and data through the internet and across modern computer networks. Topics include basic configurations for routers and switches to build simple local area networks (LANs) that integrate IP addressing schemes and foundational network security.

**Credit Hour(s):**

3

**Lecture Hour(s):**

2

**Lab Hour(s):**

2

## Requisites

**Prerequisite and Corequisite**

ITNT-2300 Networking Fundamentals.

## Outcomes

**Course Outcome(s):**

Perform basic configurations for routers and switches to build simple local area networks (LANs) that integrate IP addressing schemes and foundational network security.

**Essential Learning Outcome Mapping:**

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

**Objective(s):**

1. Configure switches and end devices to provide access to local and remote network resources.
2. Explain how physical and data link layer protocols support the operation of Ethernet in a switched network.
3. Configure routers to enable end-to-end connectivity between remote devices.
4. Create IPv4 and IPv6 addressing schemes and verify network connectivity between devices.
5. Explain how the upper layers of the open systems interconnection (OSI) model support network applications.
6. Use security best practices to configure a small local area network (LAN).
7. Troubleshoot connectivity in a small local area network (LAN).

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**Methods of Evaluation:**

Evaluation can include any combination of the following:

1. Assignments
2. Quizzes
3. Exams
4. Lab Assignments
5. Projects
6. Reports
7. Oral Evaluations
8. Skills-based examinations

**Course Content Outline:**

1. Networking Today
  - a. Networks affect our lives
  - b. Network components – host and network devices
  - c. Network representations and topologies
  - d. Common types of networks
  - e. Internet connections – local area networks (LANs), wide area networks (WANs), and the Internet
  - f. Reliable networks
  - g. Network trends such as bring your own device (BYOD), online collaboration, video, and cloud computing
  - h. Network security and solutions for networks
    - i. The IT professional - employment opportunities in the networking field
2. Basic switch and end device configuration
  - a. Access a Cisco IOS device for configuration purposes
  - b. Navigate Cisco IOS to configure network devices
  - c. The command structure of Cisco IOS software
  - d. Basic configuration of a Cisco IOS device using command line interface (CLI)
  - e. Save the running configuration using IOS commands
  - f. Ports and addresses used by devices to communicate across network media
  - g. Configure IP address on a host device
  - h. Verify connectivity between two end devices
3. Protocols and models
  - a. The rules that are necessary to successfully communicate over networks
  - b. Protocols necessary in network communications
  - c. Purpose and requirements of protocol suites
  - d. Role of standards organizations in establishing protocols for network interoperability
  - e. Reference models -how the TCP/IP and OSI models are used to facilitate standardization in the network communication process
  - f. Data encapsulation used in transport of data across the network
  - g. Data access – how local hosts access local resources on a network
4. Physical layer
  - a. Purpose and functions of the physical layer in the network
  - b. Physical layer characteristics
  - c. Copper cabling characteristics
  - d. Unshielded twisted pair (UTP) cabling in ethernet networks
  - e. Advantages of fiber-optic cabling over other media
  - f. Wireless media to connect devices
5. Number systems
  - a. Calculate numbers between decimal and binary systems
  - b. Calculate numbers between decimal and hexadecimal systems
6. Data link layer
  - a. Purpose and function of the data link layer in preparing communication for transmission on specific media
  - b. Topologies - the characteristics of media access control methods on WAN and LAN topologies
  - c. Data link frame - characteristics and functions of the data link frame
7. Ethernet switching
  - a. Ethernet frame fields and relationship to the ethernet sublayers
  - b. Ethernet MAC address
  - c. The MAC address table - how a switch builds the table and forwards frames
  - d. Switch speeds, forwarding methods and port settings on layer 2 switch ports
8. Network layer

- a. Network layer characteristics – use of IP protocols for reliable communications
  - b. IPv4 packet and the role of the major header fields
  - c. IPv6 packet and the role of the major header fields
  - d. How a host routes using routing tables to direct packets to a destination network
  - e. Router routing tables and the function of fields in the tables
9. Address resolution
    - a. Comparison of the roles of MAC and IP addresses
    - b. Purpose of address resolution protocol (ARP)
    - c. The operation of IPv6 neighbor discovery
  10. Basic router configuration
    - a. Configure initial settings on a Cisco IOS router
    - b. Configure two active interfaces on a Cisco IOS router
    - c. Configure devices to use the default gateway
  11. IPv4 addressing
    - a. IPv4 address structure, including the network portion, the host portion, and the subnet mask
    - b. IPv4 unicast, broadcast, and multicast - characteristics and uses
    - c. Types of IPv4 addresses - public, private, and reserved IPv4 addresses
    - d. Network segmentation – how subnetting segments a network to enable better communication
    - e. Subnet an IPv4 network - calculate IPv4 subnets for a /24 prefix
    - f. Subnet a /16 and /8 Prefix - calculate IPv4 subnets for a /16 and /8 prefix
    - g. Subnet to meet requirements - implement an IPv4 addressing scheme
    - h. Variable length subnet masking (VLSM) to create a flexible addressing scheme
    - i. Structured design to implement a VLSM addressing scheme
  12. IPv6 addressing
    - a. IPv4 issues and the need for IPv6 addressing
    - b. IPv6 addressing - how IPv6 addresses are represented
    - c. Compare IPv6 address types
    - d. Global unicast addresses (GUA) and link local address (LLA) static configuration - how to configure static global unicast and link-local IPv6 network addresses
    - e. Dynamic addressing for IPv6 GUAs - how to configure dynamic global unicast addresses
    - f. Dynamic addressing for IPv6 LLAs – how to configure dynamic link-local addresses
    - g. IPv6 multicast addresses – how to identify
    - h. Subnet an IPv6 network - implement a subnetted IPv6 addressing scheme
  13. Internet control message protocol (ICMP)
    - a. ICMP messages to test network connectivity
    - b. Ping and traceroute utilities to test network connectivity
  14. Transport layer
    - a. Transportation of data and the purpose of the transport layer in managing the transportation of data in end-to-end communication
    - b. TCP overview and characteristics
    - c. User datagram protocol (UDP) overview and characteristics
    - d. Port numbers - how TCP and UDP use port numbers
    - e. TCP communication process - how TCP session establishment and termination processes facilitate reliable communication
    - f. Reliability and flow control - how TCP protocol data units are transmitted and acknowledged to guarantee delivery
    - g. UDP communication - how the UDP client processes establish communication with a server
  15. Application layer
    - a. Application, presentation, and session - how the functions of the application layer, session layer, and presentation layer work together to provide network services to end user applications
    - b. Peer-to-Peer - how end user applications operate in a peer-to-peer network
    - c. Web and email protocols - how web and email protocols operate
    - d. IP addressing services - how domain name server (DNS) and dynamic host configuration protocol (DHCP) operate
    - e. File sharing services - how file transfer protocols operate
  16. Network security fundamentals
    - a. Security threats and vulnerabilities - why basic security measures are necessary on network devices
    - b. Network attacks and security vulnerabilities
    - c. Network attack mitigation techniques
    - d. Device security - configure network devices with device hardening features to mitigate security threats
  17. Build a small network

- a. Devices used in a small network
- b. Small network applications and protocols
- c. Scale to larger networks - how a small network serves as the basis of larger networks
- d. Verify connectivity - ping and tracert commands to verify connectivity and establish relative network performance
- e. Host and IOS commands to acquire information about the devices in a network
- f. Troubleshooting methodologies for networks
- g. Troubleshooting scenarios and issues with devices in the network

## Resources

Cisco Press. (2020) *Introduction to Networks v7*, Indianapolis: Cisco Press.

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Cisco Press. (2020) *Switching, Routing, and Wireless Essentials v7*, Indianapolis: Cisco Press.

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## Resources Other

Cisco Press. (2020) *Enterprise Networking, Security, and Automation v7.*, Indianapolis: Cisco Press.

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Key: 4886