COURSE OUTLINE

CSCO-281

Network Fundamentals
3 Credits

HOWARD COMMUNITY COLLEGE

Description

The focus of this course is on learning the fundamentals of networking. Topics include: the two major models used to plan and implement networks—OSI and TCP/IP; the functions and services of the OSI and TCP/IP layers; the various network devices, network addressing schemes, and the types of media used to carry data across the network. Labs will include hands-on configuration of routers and switches in client-server and peer-to-peer environments with utilization of various network tools for protocol data unit analysis and troubleshooting. Prerequisites: CMSY-106 and ELEC-107 or CMSY-106 and ELEC-140. (2 hours lecture, 3 hours lab)

Overall Course Objectives

Upon completion of this course, the student will be able to:

1. Explain the importance of data networks and the Internet in supporting business communications and everyday activities.
2. Explain how communication works in data networks and the Internet.
3. Recognize the devices and services that are used to support communications across an Internetwork.
4. Use network protocol models to explain the layers of communications in data networks.
5. Describe the importance of addressing and naming schemes at various layers of data networks.
6. Describe the protocols and services provided by the Application layer of the OSI and TCP/IP.
7. Analyze the operations and features of the Transport layer protocols and services.
8. Analyze the operations and feature of the Network layer protocols and services and explain the fundamental concepts of routing.
9. Design, calculate, and apply subnet masks and addresses to fulfill given requirements.
10. Describe the operation of protocols at the Data link layer and explain how they support communications.
11. Explain the role of Physical layer protocols and services in communications across data networks.
12. Explain fundamental Ethernet concepts such as media, services, and operation.
13. Employ basic cabling and network designs to connect devices in accordance with stated objectives.
14. Build a simple Ethernet network using routers and switches.
15. Use Cisco CLI commands to perform basic router and switch configuration and verification.
16. Analyze the operations and features of common Application layer.
17. Utilize common network utilities to verify small network operations and analyze data traffic.

Major Topics

I. Network Introduction
   - A. The Network as a Platform
   - B. The Architecture of the Internet
   - C. Trends in Networking

II. Network Communication
   - A. LANs, WANs, and Internetworks
   - B. Protocols
   - C. Layered Models (OSI model; TCP/IP model)
   - D. Network Addressing

III. Application Layer Functionality and Protocols
  A. Client-Server Model
  B. Peer-to-peer Networking
IV. OSI Transport Layer
  A. Transport Layer Protocol Roles
  B. TCP Reliability and Session Management
  C. UDP Protocol
V. OSI Network Layer
  A. Networks—Grouping Hosts
  B. Routing—How Data Packets are Handled
  C. Routing Process—How Routes are Learned
VI. IPv4 Addressing
  A. Binary Number System
  B. Types of Addresses and Address Assignment
  C. Subnetting and Subnet Masks
  D. Testing the Network Layer
VII. OSI Data Link Layer
  A. Accessing the Media; Framing; Standards
  B. Addressing and Framing
VIII. OSI Physical Layer
  A. Signals, Encoding and Media
IX. Ethernet
  A. Standards and Implementation
  B. History and Future
  C. Ethernet Frames
  D. Hexadecimal Number System
  E. CSMA/CD
  F. Hubs and Switches
  G. Address Resolution Protocol (ARP)
X. Planning and Cabling Networks
  A. Physical Connections
  B. Addressing Schemes and Subnet Calculation
XI. Configuring and Testing Networks
  A. IOS Basics
  B. Verifying Connectivity
  C. Monitoring and Documenting of Networks

Course Requirements

Grading/exams**:** Grading procedures will be determined by the individual faculty member but will include the following: Final grades will be based primarily on homework, lab exercises, lab practical and final exam.

Other Course Information

This course is a course in Electronics Technology, Telecommunications Technology, and Computer Support Technology Programs. This course is also intended for students who wish to become a Cisco Certified Network Associate.