CIT 160
Data Communications and Networking

Course Description

Data communications and networking concepts including hardware, software, and transmission media; access methods and protocols; and network configurations are included. System design considerations are addressed. Emphasis is on local area networks; students will install a simple local area network. This is the first course in the Cisco Networking Academy Curriculum. Prerequisites: none

Course Competencies

Upon successful completion of this course, the student can:
1. Describe the components of a data communications system.
2. Describe the common standards and protocols used in data communications systems.
3. Identify and explain the types of transmission media used for communications channels.
4. Describe common architectures for computer networks.
5. Describe the role of network operating systems.
6. Identify and explain the function of common network hardware.
7. Describe how data is transmitted.
8. Describe how devices such as repeaters, hubs, switches, bridges, routers, and gateways are used to connect networks.
9. Explain the OSI 7-layer model.
10. Install and manage a local area network.
11. Use a digital multimeter and explain basic electrical concepts.
12. Implement IP address and subnetting schemes.
13. Terminate cable and understand cable specifications.

Course Outline

I. The Basics of Computing
   A. Basics of Computer Hardware
   B. Basics of Computer Software
   C. Basic Networking Terminology
   D. Binary Number System
   E. Digital Bandwidth
II. The OSI Model
   A. General Model of Communication in Terms of Layers
   B. The OSI Model
   C. How the OSI Model Compares and Contrasts With the TCP/IP Model
III. Local Area Networks (LANs)
   A. Basic LAN Devices
   B. Evolution of Network Devices
   C. Basics of Data Flow Through LANs
   D. Building of LANs
IV. Layer 1 - Electronics and Signals

A. Basics of Electricity
B. Basics of Digital Multimeters
C. Basics of Signals and Noise in Communications Systems
D. Basics of the Encoding of Networking Signals

V. Layer 1 - Media, Connections, and Collisions
A. Most Common LAN Media
B. Cable Specification and Termination
C. Process of Making and Testing Cable

VI. Layer 1 Components and Devices
A. Collisions and Collision Domains in Shared Layer Environments
B. Basic Topologies Used in Networking

VII. Layer 2 - Concepts
A. Layer 2 - LAN Standards
B. Layer 2 Naming - Hexadecimal Numbers
C. Layer 2 Naming - MAC Addressing
D. Framing
E. Media Access Control (MAC)

VIII. Layer 2 - Technologies
A. Basics of Token-Ring
B. Basics of FDDI
C. Details of Ethernet and IEEE 802.3
D. Layer 2 Devices in Detail
E. Effects of Layer 2 Devices on Data Flow
F. Basic Ethernet 10Base-T Troubleshooting

IX. Design and Documentation
A. Process of Planning Structured Cabling - Wiring Closets
B. Process of Planning Structured Cabling - Horizontal and Backbone Cabling
C. Network Power Supply Issues
D. Basic Network Design and Documentation Issues

X. Structured Cabling Project
A. How to Plan the Project
B. Stringing, Running, and Mounting Cable
C. RJ-45 Jack and Outlet Installation
D. Basics of Cable Installation
E. Installation of Structured Cable Runs
F. Basics of Wiring Closets and Patch Panels
G. Range of Equipment for Testing Structured Cabling Projects

XI. Layer 3 - Routing and Addressing
A. Why It Is Necessary to Have a Network Layer
B. Path Determination
C. Purpose and Operation of IP Addresses within the IP Header
D. Working with IP Address Classes
E. Purpose of Reserved Address Space
F. Basics of Subnetting
G. How to Create a Subnet

XII. Layer 3 - Routing Protocols

A. Characteristics of Layer 3 Devices
B. How Network Layer Services Are Used to Achieve Network-to Network Communications
C. Advanced ARP Concepts
D. Routable Protocols
E. Routing Protocols
F. Function of Other Network Layer Services in Internet
G. Communication
H. ARP Tables
I. RIP and IGRP
J. Protocol Analyzer Software

XIII Layer 4 - The Transport Layer
A. Layer 4 - Transport Layer
B. TCP and UDP
C. TCP Connection Methods

XIV. Layer 5 - The Session and Presentation Layer
A. Basics of the Session Layer
B. Basics of the Presentation Layer

XV. Layer 7 - The Application Layer
A. Client-Server Applications
B. Domain Name Services
C. Various Network Applications
D. Application Layer Examples: E-mail
E. Application Examples: Telnet
F. Application Examples: FTP
G. Application Example: HTTP
H. Application Example: Redirectors
I. Basics of the Application Layer