

# Common Course Outline

## DCOM 251

### Local Area Networks

4 Semester Hours

## The Community College of Baltimore County

### Description

**DCOM 251 – 4 Credits – Local Area Networks** explores planning, installing, configuring, administering, and troubleshooting a computer network. This is accomplished through hands-on exercises and lecture material covering the fundamental building blocks that form a modern network, such as protocols, topologies, hardware, and network operating systems.

This class is intended to serve the needs of students who are interested in mastering foundational, vendor-independent networking concepts, as well as those interested in taking the CompTIA Network+ certification exam.

**4 credits; 4 lecture hours per week**

**Prerequisite: DCOM 101 or consent of the Program Coordinator**

### Overall Course Objectives

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

1. define the layers of the OSI and DARPA networking models;
2. describe signaling techniques used on modern networks, including those used over wired and wireless networks;
3. describe the advantages of different networking media;
4. utilize TCP/IP for networked communication;
5. integrate disaster recovery solutions in a given network environment;
6. illustrate the variety of physical and logical topologies used to build networks;
7. discriminate between a well-designed and a poorly designed network;
8. select the best network design, hardware, and software for a given environment;
9. plan, setup, administer, and troubleshoot a Local Area Network (LAN);
10. describe the role of information security in today's computing environments;  
and
11. utilize network diagrams.

## **Major Topics**

- I. Introduction to Networking
  - a. Describe why to use networks
  - b. Discuss the types of networks
  - c. Discuss elements common to client/server and peer-to-peer networks
  - d. Explore the factors driving the convergence of networking and communications technologies
  - e. Discuss how networks are used
- II. Networking Models and Standards
  - a. Discuss what the role is of the following organizations/standards: ANSI, EIA/TIA, IEEE, ISO, ITU, ISOC, IANA, and ICANN
  - b. Define the layers of the OSI model
  - c. Apply how the layers of the OSI model apply to real-world scenarios
  - d. Define the layers of the DARPA networking model and discuss how this model compares with the OSI model
- III. Transmission Basics and Networking Media
  - a. Describe analog and digital signaling
  - b. Discuss how data modulation works
  - c. Discuss transmission directions (e.g., simplex) and flaws
  - d. Describe the relationships between nodes
  - e. Discuss throughput, bandwidth, broadband, and baseband and the differences between them
  - f. Describe common media characteristics
  - g. Describe the components and characteristics of the primary media types (including wireless)
  - h. Discuss cable design, installation, and management issues
- IV. Network Protocols
  - a. Describe the TCP/IP core protocols
  - b. Define both classful and Classless Inter-Domain Routing (CIDR) IPv4 addressing schemes
  - c. Discuss IPv6 addressing advantages and differences compared with IPv4
  - d. Assign IP addresses
  - e. Discuss sockets and ports and identify well-known port numbers
  - f. Describe what Network Address Translation (NAT) is and some of the benefits it provides network administrators
  - g. Demonstrate the ability to work with the following command-line utilities: Netstat, Nbtstat, Nslookup, Dig, Whois, Traceroute, Ipconfig, and Ifconfig
- V. Networking Hardware
  - a. Discuss the types of NICs and how to install
  - b. Describe how a repeater, hub, bridge, switch, router, and gateway works and discuss the differences between them
- VI. Topologies and Access Methods
  - a. Define physical and logical topology characteristics

- b. Discuss the characteristics and advantages of using the following technologies: Ethernet, Token Ring, Fiber Distributed Data Interface (FDDI), Asynchronous Transfer Mode (ATM), and wireless networks
- VII. Wide Area Networks
- a. Discuss WAN essentials, including topologies
  - b. Describe how the following WAN technologies work and discuss the major characteristics of each: Public Switched Telephone Network (PSTN, X.25, Frame Relay, ISDN, T-Carriers, xDSL, broadband cable, wireless WANs
  - c. Discuss the following remote connectivity technologies: dial-up networking, remote access servers, remote access protocols
  - d. Describe the different types of Virtual Private Networks (VPN) including common VPN protocols
  - e. Describe what Voice Over IP (VoIP) is and its relationship to data communications
- VIII. Network Operating Systems
- a. Discuss how to select a network operating system given certain computing/networking requirements
  - b. Describe common network operating system services and features
  - c. Discuss planning for, installing, configuring, administering, and troubleshooting network operating systems
  - d. Demonstrate best practices for hardening network operating systems
- IX. Integrity and Availability
- a. Define integrity and availability and discuss why they are critical in today's computing environments
  - b. Discuss common fault-tolerant measures including: power flaws and requirements, redundancy, server and network designs, storage, and data backup options
  - c. Discuss what disaster recovery is, including a discussion on disaster recovery planning and contingencies
- X. Information Security
- a. Define information security
  - b. Discuss the major goals of information security
  - c. Describe the major topic areas of information security (e.g., Cryptography, wireless security, physical security, etc.)
  - d. Discuss security in network design, such as firewalls, proxy servers, Intrusion Detection Systems/Intrusion Prevention Systems
  - e. Discuss common operating systems security measures
  - f. Discuss cryptography basics including symmetric, asymmetric, and hashing algorithms, secure E-mail, SSL, SSH, and IPSec
  - g. Discuss and differentiate between various authentication protocols

## **Course Requirements**

Grading/exams: Procedures for grading will be determined by the individual faculty member, but will include:

- A minimum of seven graded assignments.
- A comprehensive final examination.
- Other graded assignments may come from any combination of the following categories: quizzes, hourly exams, a midterm exam, group projects, or individual reports/presentations.

Individual faculty members may include additional course objectives, major topics, and other course requirements to the minimum expectations stated in the Common Course Outline.