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.
Main 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.