Data Communications

Course Design

2005-2006

Course Information

Organization	EASTERN ARIZONA COLLEGE
Division	Business
Course Number	CMP 205
Title	Data Communications
Credits	3
Developed by	Mike Moore
Lecture/Lab Ratio	3 Lecture/0 Lab
Transfer Status	Transferable - Elective
Activity Course	No
CIP Code	11.0100
Assessment Mode	Pre/Post Test (80 Questions/80 Points)
Semester Taught	Upon Request
GE Category	None
Separate Lab	No
Awareness Course	No
Intensive Writing Course	No

Prerequisites

CMP 101 or CMP 103

Educational Value

This course is intended for computer program majors, but would be useful for anyone who wants to understand the basic principles of Data Communications.

Description

This course provides an introduction to data communications. Topics include an introduction to and the fundamentals of communications, communications media, servers, and clients, communication equipment and services, data transmission, protocols, network concepts, local area, wide area, and metropolitan area networks, network management and security, the Internet, e-business applications and the business data communications industry, and addressing the challenge of living in a connected world.

Supplies

Access to a networked Personal Computer. Access to Microsoft Visio.

Competencies and Performance Standards

1. Define the basic concept of data communications.

Learning objectives

What you will learn as you master the competency:

a. describe the difference between data communications and telecommunications.

b. explain the components of a communications system.

c. list the standards-setting organizations involved in the communication industry.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will describe the difference between data communications and telecommunications.

o learner will explain the components of of a communications system.

o learner will list the standards-setting organizations involved in the communication industry.

2. Explain the fundamentals principles of data communications.

Learning objectives

What you will learn as you master the competency:

a. differentiate between bit rates and baud rates.

b. define the data codes used in data communications.

c. describe the purpose of a modem.

d. define the voice communication network.

e. describe how the telephone network operates.

f. describe the difference between a dialed and dedicated circuit.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will differentiate between bit rates and baud rates.

o learner will define the data codes used in data communications.

o learner will describe the purpose of a modem.

o learner will define the voice communication network.

o learner will describe how the telephone network operates.

o learner will describe the difference between a dialed and dedicated circuit.

3. List the characteristics of the various media used in data communications.

Learning objectives

What you will learn as you master the competency:

a. list the difference between conducted media and radiated media.

b. define twisted pair, coaxial cable, and fiber optics.

c. demonstrate how the different types of cables are used in networks.

d. describe the difference between microwave and broadcast radio.

e. describe the advantages of one medium over another medium in terms of cost, speed, and data reliability.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will list the difference between conducted media and radiated media.

o learner will define twisted pair, coaxial cable, and fiber optics.

o learner will demonstrate how the different types of cables are used in networks.

o learner will describe the difference between microwave and broadcast radio.

o learner will describe the advantages of one medium over another medium in terms of cost, speed, and data reliability.

4. Articulate how communications equipment is utilized.

Learning objectives

What you will learn as you master the competency:

a. describe the differences between frequency division multiplexing, time division multiplexing, and statistical time division multiplexing.

b. explain how front-end processors are used in a data communication network.

c. describe the differences among controllers, front end processors, and concentrator.

d. define protocol conversion and why it is needed in data communications networks.

e. list equipment needed to monitor a network and ensure it is working properly.

f. define a computer port and explain how data can be directed to different ports.

g. describe the differences among hubs, bridges, switches, routers, front-end processors, and controllers.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will describe the differences between frequency division multiplexing, time division multiplexing, and statistical time division multiplexing.

o learner will explain how front-end processors are used in a data communication network.

o learner will describe the differences among controllers, front end processors, and concentrator.

o learner will define protocol conversion and why it is needed in data communications networks.

o learner will list equipment needed to monitor a network and ensure it is working properly.

o learner will define a computer port and explain how data can be directed to different ports.

o learner will describe the differences among hubs, bridges, switches, routers, front-end processors, and controllers.

5. Relate how data is transmitted in a data communications network.

Learning objectives

What you will learn as you master the competency:

a. describe amplitude modulation, frequency modulation, and phase modulation and distinguish among the three.

b. describe three examples each of simplex, half duplex, and full duplex data transmission.

c. describe how errors are detected, prevented, and corrected on a data communication network.

d. describe the difference between serial and parallel transmission.

e. identify the differences between asynchronous and synchronous transmission.

f. define digital transmission and explain how it works.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will describe amplitude modulation, frequency modulation, and phase modulation and distinguish among the three.

o learner will describe three examples each of simplex, half duplex, and full duplex data transmission.

o learner will describe how errors are detected, prevented, and corrected on a data communication network.

o learner will describe the difference between serial and parallel transmission.

o learner will identify the differences between asynchronous and synchronous transmission.

o learner will define digital transmission and explain how it works.

6. Describe protocols used in data communications.

Learning objectives

What you will learn as you master the competency:

a. describe the role of software in a data communication network.

b. define a protocol and how it is used in a network.

c. list the various classifications of protocols.

d. explain the Open Systems Interconnection (OSI) model.

e. differentiate between mainframe and personal computer protocols.

f. describe the difference among character-oriented, byte-count-oriented, and bit-oriented protocols.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will describe the role of software in a data communication network.

o learner will define a protocol and how it is used in a network.

o learner will list the various classifications of protocols.

o learner will explain the Open Systems Interconnection (OSI) model.

o learner will differentiate between mainframe and personal computer protocols.

o learner will describe the difference among character-oriented, byte-count-oriented, and bit-oriented protocols.

7. Describe basic networking concepts.

Learning objectives

What you will learn as you master the competency:

a. define terms used when describing a network.

b. differences among circuit-switching, message-switching, and packet-switching networks.

c. list the types of routing techniques used to move data through a network.

d. define what is meant by the term topology.

e. list and describe the topologies used in various networks.

f. describe the difference between a public and a private network.

g. illustrate the difference between a LAN and a WAN.

h. describe the function of the Internet and intranets.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will define terms used when describing a network.

o learner will list the differences among circuit-switching, message-switching, and packet-switching networks.

o learner will list the types of routing techniques used to move data through a network.

o learner will define what is meant by the term topology.

o learner will list and describe the topologies used in various networks.

o learner will describe the difference between a public and a private network.

o learner will illustrate the difference between a LAN and a WAN.

o learner will describe the function of the Internet and intranets.

8. Explain Wide Area Networks.

Learning objectives

What you will learn as you master the competency:

a. explain IBM's System Network Architecture. and how it relates to today's communication environments.

b. explain IBM's System Network Architecture. and how it relates to today's communication environments.

c. define System Application Architecture and how it is used in a wide area network.

d. describe the use of Digital Network Architecture.

e. illustrate the differences among the layered architectures of SAN, SAA, DNA, and the OSI model.

f. explain how electronic data interchange (EDI) uses wide area networks.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will describe the topologies used in wide area networks.

o learner will explain IBM's System Network Architecture. and how it relates to today's communication environments.

o learner will define System Application Architecture and how it is used in a wide area network.

o learner will describe the use of Digital Network Architecture.

o learner will illustrate the differences among the layered architectures of SAN, SAA, DNA, and the OSI model.

o learner will explain how electronic data interchange (EDI) uses wide area networks.

9. Describe the relationship of data communications to the Internet.

Learning objectives

What you will learn as you master the competency:

a. describe the history of the Internet.

b. explain Internet addressing schemes.

c. describe the makeup of the Internet.

d. list the uses of the World Wide Web.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will describe the history of the Internet.

o learner will explain Internet addressing schemes.

o learner will describe the makeup of the Internet.

o learner will list the uses of the World Wide Web.

10. Explain Local Area Networks.

Learning objectives

What you will learn as you master the competency:

a. describe the hardware and software used in a local area network.

b. list the topologies used in local area networks.

c. specify the differences among CSMA/CD, token ring, token bus, ARCNET, and Appletalk.

d. describe peer-to-peer and server based networks and show how they are different.

e. differentiate between various network operating systems.

f. define gateway, bridge, and router in the context of local area networks.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Performance will be satisfactory when:

o learner will describe the hardware and software used in a local area network.

o learner will list the topologies used in local area networks.

o learner will specify the differences among CSMA/CD, token ring, token bus, ARCNET, and Appletalk.

o learner will describe peer-to-peer and server based networks and show how they are different.

o learner will differentiate between various network operating systems.

o learner will define gateway, bridge, and router in the context of local area networks.

11. Explain network security.

Learning objectives

What you will learn as you master the competency:

a. list the types of physical security used on a computer network.
b. list three types of security software.
c. describe two types of encryption.
d. describe digital signatures and digital certificates.
e. define the Secure Sockets Layer
f. list the differences between a virus and a worm.
g. describe firewalls.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.
o when learner completes chapter project with a passing grade.
o when the learner completes the final exam.

Criteria - Performance will be satisfactory when:

o learner will list the types of physical security used on a computer network.
o learner will list three types of security software.
o learner will describe two types of encryption.
o learner will describe digital signatures and digital certificates.
o learner will define the Secure Sockets Layer.
o learner will list the differences between a virus and a worm.
o learner will describe firewalls.

12. Describe network management.

Learning objectives

What you will learn as you master the competency:

a. list and explain the objectives of network management.
b. define the characteristics of the network that affect user satisfaction.
c. describe cost-effective techniques that can be used in network management.
d. define two types of network security.
e. list the differences between worms and viruses on a network.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.
o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Criteria - Performance will be satisfactory when:

o learner will list and explain the objectives of network management.

o learner will define the characteristics of the network that affect user satisfaction.

o learner will describe cost-effective techniques that can be used in network management.

o learner will define two types of network security.

o learner will list the differences between worms and viruses on a network.

13. Describe communication services

Learning objectives

What you will learn as you master the competency:

a. differentiate between narrowband and wideband communications services.

b. define what is meant by a Virtual Private Network (VPN).

c. differentiate between voice-grade and wideband analog circuits.

d. describe the types of digital subscriber lines (DSL).

e. define fast packet services.

Performance Standards

Competence will be demonstrated:

o when learner completes practice quiz for this unit.

o when learner completes chapter project with a passing grade.

o when the learner completes the final exam.

Criteria - Performance will be satisfactory when:

o learner will differentiate between narrowband and wideband communications services.

o learner will define what is meant by a Virtual Private Network (VPN).

o learner will differentiate between voice-grade and wideband analog circuits.

o learner will describe the types of digital subscriber lines (DSL).

o learner will define fast packet services.

14. Explain the impact of e-business on data communications.

Learning objectives

What you will learn as you master the competency:

a. describe the effect of e-commerce on IT departments.

b. define the purpose of an application service provider.

c. identify problems that can occur when businesses conduct transactions over the Internet.

d. list e-commerce standards.

e. describe the use of intranets and extranets for e-commerce.

Performance Standards

Competence will be demonstrated:

- o when learner completes practice quiz for this unit.
- o when learner completes chapter project with a passing grade.
- o when the learner completes the final exam.

Criteria - Performance will be satisfactory when:

- o learner will describe the effect of e-commerce on IT departments.
- o learner will define the purpose of an application service provider.
- o learner will identify problems that can occur when businesses conduct transactions over the Internet.
- o learner will list e-commerce standards.
- o learner will describe the use of intranets and extranets for e-commerce.

Types of Instruction

Classroom Presentation

On Campus Laboratory

Grading Information

Grading Rationale

Pre-Post test 10%

Tests/Quizzes 40%

Projects/Labs 50%

Grading Scale

A 90-100%

B 80-89%

C 70-79%

D 60-69%

F 0-59%