

Last time that this course
will be delivered.

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: COMPUTER NETWORKS

Code No.: CET314-4 Semester: 6

Program: COMPUTER ENGINEERING TECHNOLOGY

Author: M. ALLEMANG

Date: JAN., 1996 Previous Outline Dated: JAN. 1995

APPROVED:

Dean

Date

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TOTAL CREDITS: 4

PREREQUISITES: CET222

I. PHILOSOPHY/GOALS:

This course in Computer Networks for Computer Technology students in their 6th semester, expands upon the basic principles of Data Communications developed in CET222, emphasizing local and wide area networks in a Netware environment.

Computer networking topics in the following specific areas are studied: The OSI and other protocol stacks for computer networks, TCP/IP, the Internet and its protocols, Local Area Network (LAN) alternatives and the IEEE 802 standards; Wide Area Network (WAN) Technologies: X.25, ISDN, frame relay, ATM, SONET, MANs ; Netware LAN history, features, workstation and server installation, management and programming; Netware IPX/SPX protocols; Bridges and Routers; Case Studies of WANs and LANs.

Lab exercises on Netware LANs, the Internet and UNIX-based systems form an important component of this course.

II. STUDENT PERFORMANCE OBJECTIVES (OUTCOMES):

Upon successful completion of this course the student will:

1. Describe LAN and WAN basic concepts and the role of the OSI model in networking.
2. Specify appropriate WAN interconnection strategies using available digital technologies.
3. Describe the characteristics of various LAN Operating Systems.
4. Demonstrate the installation and management of Novell Netware file servers, print servers and workstations.
5. Explain the operation of Netware Native Protocols like IPX/SPX and implement them in programs.
6. Describe Bridging and Routing devices and protocols used in

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their implementation.

7. Use the Internet and its associated protocols to efficiently retrieve information.
8. Explain the operation of the TCP/IP protocols and be able to integrate them into the Netware LAN environment.
9. Describe current LAN standards and products for the Physical and Data Link Layers.
10. Identify appropriate network troubleshooting techniques.
11. Present a case study of a particular local or global LAN or WAN.

III. TOPICS TO BE COVERED:

1. LAN and WAN concepts and the OSI Model of computer networks.
2. WAN interconnection alternatives such as T1, X.25, ISDN, FRAME RELAY, ATM, and MANs.
3. LAN Operating System characteristics and alternatives.
4. Novell Netware LAN history, architecture, features, commands, installation and management.
5. Netware IPX/SPX protocols and their implementation in programs.
6. LAN Bridges and Routers.
7. The use of the Internet and its protocols.
8. TCP/IP protocols and their integration into the Netware environment.
9. Physical and Data Link Layer LAN standards and products.
10. Network Troubleshooting.
11. LAN or WAN Case Study.

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IV. LEARNING ACTIVITIES/REQUIRED RESOURCES

1.0 LAN and WAN Concepts and the OSI Model

Learning Activities:

- 1.1 Participate in a review quiz of data communications and networks concepts.
- 1.2 Review OSI Model and summarize tasks suitable to the 7 layers.
- 1.3 Review the differences between LANs and WANs.
- 1.4 Watch a video on future directions in Information Technology.
- 1.5 Participate in a discussion about trends in computer networking.
- 1.6 Overview the major Network protocols and their characteristics.

Resources:

Handout on Lans/Wans
Video on I.T. Forum

2.0 WAN Interconnection Alternatives

Learning Activities:

- 2.1 Listen to presentation on the nature of digital transmission and T1 circuits.
- 2.2 Listen to presentation on X.25 packet switching and frame relay systems.
- 2.3 Compare T1, X.25 and frame relay as LAN interconnect methods.
- 2.4 Listen to a presentation on ISDN, Integrated Services Digital Network.
- 2.5 Listen to a presentation on ATM, Asynchronous Transfer Mode and SONET.
- 2.6 Listen to a presentation on MANs, Metropolitan Area Networks.

Resources:

Handouts, Netware text, Chap.4 "Wans and Mans"

3.0 LAN Operating System Alternatives

Learning Activities:

- 3.1 Listen to a presentation on network operating systems, types and characteristics.

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- 3.2 Watch a video on LANs and complete assigned questions based on it.
- 3.3 Summarise the important differences between LANs, networks and internetworks and the use of repeaters, bridges, concentrators, switches, routers and gateways to interconnect and extend them.
- 3.4 Listen to a presentation on Novell Netware operating system history, versions and internal architecture.

Resources:

Handouts, Netware text, chap. 6
Video, "Understanding LANs" by Scott Forster.

4.0 Novell Netware

Learning Activities:

- 4.1 Monitor and manage a Novell Netware file server's resources by effectively using Netware commands and utilities.
- 4.2 Listen to a presentation on Netware's File System trustee rights and file attributes.
- 4.3 Examine Netware's security features and apply them on a specific server.
- 4.4 Install Netware 3.x on a file server and configure it to specifications.
- 4.5 Maintain a logbook of various server installation processes.
- 4.6 Install required user application software and utilities on a Netware server.
- 4.7 Listen to a presentation on Netware printing and print servers.
- 4.8 Install a print server and remote workstation printer on an existing Netware LAN.
- 4.9 Listen to a presentation on DOS workstation configuration for Netware LANs.
- 4.10 Setup a DOS workstation boot disk with appropriate login script and menu system as requested.
- 4.11 Listen to a presentation on the features of Netware v4.0.

Resources:

Handouts, Netware text, Chap. 6-11, 21-26.
Netware Installation Manuals and Disks.
Netware Command Reference (Netware disk)

5.0 Netware Native Protocols

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Learning Activities:

- 5.1 Listen to a presentation on Netware native protocols, such as IPX, SPX, and NCP.
- 5.2 Study the operation of C programs and the data structures and functions that are used to implement the IPX/SPX protocols on Netware LANs.
- 5.3 Write C programs using IPX/SPX protocols to perform assigned tasks.

Resources:

Handouts, sample IPX programs.
Netware text, Chap. 1,3

6.0 Bridges and Routers

Learning Activities:

- 6.1 Listen to a presentation on repeaters, bridges and routers.
- 6.2 Watch a video on LANs and use its examples to select appropriate interconnect devices for forming WANs.
- 6.3 Listen to a presentation on Netware's bridging and routing protocols.

Resources:

Handouts, Netware text Chap. 3
"Understanding LANs" video.

7.0 The Internet

Learning Activities

- 7.1 Listen to presentation on use of major Internet tools such as Listservs, ftp, telnet, archie, gopher, veronica and world wide web.
- 7.2 Practice effective information retrieval and research skills by completing an assignment using the Internet.
- 7.3 Use e-mail effectively to share information with others.

Resources:

Handouts, Information sources on the Internet

8.0 TCP/IP Protocols

Learning Activities:

- 8.1 Listen to presentations on the IP and TCP protocols.

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- 8.2 Listen to a presentation on Address Resolution and IP routing.
- 8.3 Integrate TCP/IP protocols into a Netware v 3.x LAN.

Resources:

Handouts, Netware text Chap. 1,3

9.0 **Physical and Data Link Layer LAN Standards**

Learning Activities:

- 9.1 Review the IEEE 802 LAN standards.
- 9.2 Review LAN media and investigate recent LAN media improvements.
- 9.3 Summarize LAN devices and characteristics based on Ethernet, Token Ring, Arcnet and LocalTalk LANs.

Resources:

Handouts, Netware text Chap. 2

10.0 **Network Troubleshooting**

Learning Activities:

- 10.1 Summarize typical LAN cable problems and techniques for troubleshooting such faults.
- 10.2 Use LAN analyzer products to monitor and analyze network performance and problems.

11. **LAN and WAN Case Study**

Learning Activities:

- 11.1 Research a LAN or WAN of special interest and summarize as a case study in a written report.
- 11.2 Interview relevant network specialists to obtain case study material.
- 11.3 Present case study to the class in a 15 minute oral presentation.

Resources:

Network managers and relevant documentation on LANs or WANs of interest.

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V. EVALUATION METHODS:

2 THEORY TESTS (25% each)	50%
LAB PROJECTS/ASSIGNMENTS	32%
QUIZZES	10%
CASE STUDY (PRESENTATION)	8%

(The percentages shown above may vary slightly where circumstances warrant.)

GRADING SCHEME

A+	90	-	100%
A	80	-	89%
B	70	-	79%
C	55	-	69%
I	Incomplete		
R	Repeat		

UPGRADING OF INCOMPLETES

When a student's course work is incomplete or final grade is below 55%, there is the possibility of upgrading to a pass when a student meets the following criteria:

1. The students attendance has been satisfactory.
2. An overall average of at least 40% has been achieved.
3. The student has not had a failing grade in all of the theory tests taken.
4. The student has made reasonable efforts to participate in class and complete assignments.

VI. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced standing in the course should consult the instructor. CET314 is not eligible for challenge at the present time.

VII. REQUIRED STUDENT RESOURCES:

TEXT BOOKS: "NETWARE: THE PROFESSIONAL REFERENCE"
by Karanjit Siyan (4th Ed.)
New Riders Publishing

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VIII ADDITIONAL RESOURCE MATERIALS AVAILABLE:

The Internet

There will be assignments given where resource material can be found on the Internet.

Book Section

1. "Programmers Guide to Netware" by C. Rose
2. Novell Netware Installation Guide and Users Manuals

Audiovisual Section

1. "Understanding LANs" video by Scott Forster.
2. "Information Technology Forum" video, Feb. 1994,
3. Others as available.

IX. SPECIAL NOTES:

Students with special needs (eg. physical limitations, visual or hearing impairments, or learning disabilities) are encouraged to discuss any required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as deemed necessary to meet the needs of students or take advantage of new or different learning opportunities.

