

CIS 777

Telecommunications

Networks

Raj Jain

Raj Jain is now at
Washington University in Saint Louis
Jain@cse.wustl.edu
<http://www.cse.wustl.edu/~jain/>



- How
- What
- When
- Why



- How am I going to grade you?
- What are **we** going to cover?
- When are **you** going to do it?
- Why you should **not** take this course?

Grading

- ❑ Quizzes (Best 2 of 3) 50%
- ❑ Class participation 10%
- ❑ Homeworks+Labs 40%
 - The division of grades between homeworks and labs will depend on the number of labs
 - Most likely it will be 20% for homeworks and 20% for labs.

Frequently Asked Questions

- ❑ Yes, I do use “curve”. Your grade depends upon the performance of the rest of the class.
- ❑ All homeworks are due at the beginning of the next class.
- ❑ All late submissions must be preapproved.
- ❑ All quizzes are open-book and extremely time limited.
- ❑ Quizzes consist of numerical as well as multiple-choice (true-false) questions.
- ❑ There is negative grading on incorrect multiple-choice questions.
- ❑ Everyone including the graduating seniors are graded the same way.

Text Book

- W. Stallings, "ISDN and Broadband ISDN with Frame Relay and ATM," **3rd Ed.**, Prentice-Hall, 1995, ISBN 0-02-415513-6, 581 pp.

Supplementary Texts

- ❑ G. Sackett and C. Y. Metz, "ATM and Multiprotocol Networking," McGraw-Hill, 1997.
- ❑ H. J. R. Dutton and P. Lenhard, "Asynchronous Transfer Mode (ATM): Technical Overview," **2nd Ed**, Prentice-Hall, 1995, ISBN 0-13-520446-1.
- ❑ U. Black, "Emerging Communications Technologies," Prentice-Hall, 1994, ISBN 0-13-051500-0, 428 pp.
- ❑ W. Stallings, "Data & Computer Communications," **5th Ed**, Prentice-Hall, 1996, ISBN 0-02-415425-3.
- ❑ A. S. Tanenbaum, "Computer Networks", **3rd Ed**, Prentice-Hall, 1996, ISBN 0-13-349945-6, 813 pp.

Prerequisite: CIS677

- ❑ Protocol Layers: ISO/OSI reference model
- ❑ Physical Layer: Coding, Manchester
- ❑ Transmission Media: UTP, Cat 5, Microwave, Radio
- ❑ Data Communication: Asynchronous vs synchronous, Baud, bit, and Hz, Half-Duplex vs Full-duplex, Modulation/Demodulation
- ❑ Packet Transmissions: Framing, Bit stuffing, byte stuffing
- ❑ Flow Control: On-Off, Window
- ❑ Error Detection: Parity, Checksum, Cyclic Redundancy Check

Prerequisites (Cont)

- ❑ Error Recovery: Start and Stop, Go back n , Selective Reject
- ❑ LANs: Aloha, CSMA/CD, Ethernet, IEEE 802.3, Token Ring/IEEE 802.5, FDDI
- ❑ LAN Addressing: Unicast vs multicast, Local vs Global
- ❑ LAN wiring: 10Base5, 10Base2, 10Base-T, 100Base-T4, 100Base-TX, 100Base-FX
- ❑ Extended LANs: Hubs, Bridges, Routers, Switches
- ❑ Routing: Distance Vector vs Link State, Spanning tree, source routing
- ❑ Network Layer: Connectionless vs connection oriented

Schedule (Tentative)

3/31/98 Overview, Networking Trends

4/2/98 Basic Concepts: Data Networks

4/7/98 Basic Concepts: Telecommunications Networks

4/9/98 X.25

4/14/98 Frame Relay

4/16/98 Quiz 1

4/21/98 Frame Relay Congestion Control

4/23/98 ISDN

4/28/98 SONET

Schedule (Cont)

4/30/98 Introduction to ATM

5/5/98 ATM Traffic Management

5/7/98 Quiz 2

5/12/98 Legacy traffic over ATM 1

5/14/98 Legacy traffic over ATM 2

5/19/98 ATM PNNI

5/21/98 Mobile Communications Technologies 1

5/26/98 Mobile Communications Technologies 2

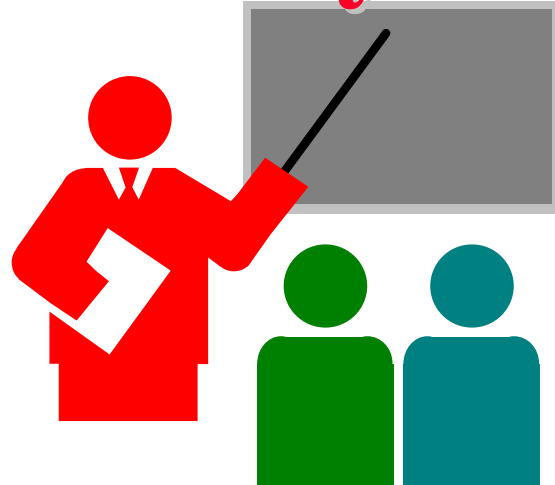
5/28/98 Quiz 3

6/2/98 Graduating Seniors' grades due

Office Hours

- Tuesday: 2:00 to 2:30 PM
Thursday: 2:00 to 2:30 PM
- Office: 297 Dreesse Lab, 2015 Neil Ave

Summary



- ❑ There will be a lot of self-reading
- ❑ Goal: To prepare you for a career in networking
- ❑ Get ready to work hard

Quiz 0: Prerequisites

True or False?

T F

- Datalink refers to the 2nd layer in the ISO/OSI reference model
- Category 5 unshielded twisted pair cable is better than category 3 cable.
- Finding path from one node to another in a large network is a transport layer function.
- It is impossible to send 3000 bits/second through a wire which has a bandwidth of 1000 Hz.
- Bit stuffing is used so that characters used for framing do not occur in the data part of the frame.
- For long delay paths, on-off flow control is better than window flow control.
- Ethernet uses a CSMA/CD access method.
- 10Base2 runs at 2 Mbps.
- The packets sent in a connection-oriented network are called datagrams.
- Spanning tree algorithm is used to find a loop free path in a network.

Marks = Correct Answers _____ - Incorrect Answers _____ = _____

Homework 1

- ❑ From Tanenbaum's book, review sections 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 3.6.1
- ❑ Submit answers to exercises 1.17, 2.3, and 3.3
- ❑ Due Date: Tuesday, April 7, 1998.

- ❑ **Ex 1.17:** A system has n layer protocol hierarchy. Applications generated messages of length M bytes. At each of the layers, an h -byte header is added. What fraction of the network bandwidth is filled with headers.
- ❑ **Ex 2.3:** Television channels are 6 MHz wide. How many bits/sec can be sent if four-level digital signals are used. Assume a noiseless channel.
- ❑ **Ex 3.3:** If the bit string 01110111110111110 is bit stuffed, what is the output string (on wire).

Homework 2

- ❑ From Tanenbaum's book, review sections 4.3, 4.4, 4.5, 5.2, 5.5.1, 5.5.2, 5.5.3, 6.4
- ❑ Submit answers to exercises 4.22, 5.28, 6.15
- ❑ Due Date: Thursday, April 9, 1998

- ❑ **Ex 4.22:** Sketch the Manchester encoding for the bit stream: 0001110101
- ❑ **Ex 5.28:** A class B network on the Internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts per subnet.
- ❑ **Ex 6.15:** The maximum payload of a TCP segment is 65,515 bytes. Why was such a strange number chosen?