

Carnegie Mellon University

Department of Electrical and Computer Engineering

18-345/14-645 Introduction to Telecommunication Networks

Fall 2008

COURSE SYLLABUS

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Class Schedule:

Lecture:	Monday and Wednesday	10:30-12:20AM, PH 125C
Recitation:	Friday	12:30-2:20PM, DH 2210

Course Objectives

Networking technology is one of the fastest growing engineering areas. “Information Superhighway” promises to provide various digital services ranging from conventional telephone to interactive high-definition TV. Regional telephone companies and cable companies are investing billions of dollars to provide an infrastructure for high-speed networks and new business models are being established through Internet.

This course introduces fundamental concepts of telecommunication networks. Underlying engineering principles of telephone networks, computer networks, and integrated networks are discussed. Topics in the course include: telephone and data networks overview; OSI layers; physical layer and coding; data link protocol; flow control, congestion control, routing; local area networks (Ethernet, Wireless, etc.); transport layer; introduction to high-speed networks (MPLS, ATM, Gigabit Ethernet); performance evaluation techniques.

Textbook:

Communication Networks, Second Edition, by A. Leon-Garcia and I. Widjaja, McGraw-Hill, ISBN 0-07-246352-X.

References:

1. Digital Telephony, by J. Bellamy, John Wiley & Sons, Inc., New York
2. Data Networks, by D. Bertsekas and R. Gallager, Prentice Hall, New Jersey.
3. Larry Peterson and Bruce Davies, Computer Networks: A Systems Approach, 3rd edition, Morgan-Kaufmann.
4. Computer Networking: A Top-Down Approach, James Kurose and Keith Ross, 4th edition, Addison Wesley.

Outline of the course

- Introduction to Data and TDM Networks
- Telephone Networks
 - Network hierarchy
 - Signaling systems
 - Switching systems
- OSI Layered Network Architecture
- Introduction to Physical Layer Concepts
- Local Area Networks
 - ALOHA, Ethernet
 - Token ring
 - Wireless
- Internet
 - Inter-networking with IP
 - Routing protocols
 - Transport protocols: UDP and TCP
- Integrated and Next Generation Networks
 - ATM
 - MPLS, GMPLS
- Overview of key Application Domains
 - The Web
 - Multimedia
 - Peer-to-peer networks
- Performance evaluation techniques
 - Simulation
 - Elementary queueing theory concept

Background and Prerequisites:

Probability Theory (36-217 or sequence of 36-211,212 or 36-225,226) and C/C++ programming skill.

Lecture Notes:

The lecture notes will be available on the course website: www.cs.cmu.edu/~prs/nets-ece.

Office Hours:

Students are strongly encouraged to make use of office hours to resolve questions about the course material or projects. The times of the weekly office hours will be posted on the course web site. If necessary, students can also make appointments to meet with the instructor or TAs at other times.

Homeworks:

Homeworks will be assigned throughout the course. These assignments will be collected *but will NOT be graded*. They are only to help you understand the material and will not be counted toward the final grade. The solutions will be provided. Homeworks will generally be handed out the week before a quiz and cover the same material.

Projects:

The course includes a series of five network software projects. The objective of these projects is to expose students to network software programming. More details will be given later in the course. The projects are worth 30% total.

Tests:

There will be 5 quizzes and 2 exams in the course.

- Quizzes: Your best 4 out of 5 quizzes will be counted 5% each toward the final grade, for a total of 20%. Each quiz will be given in the last 30 minutes of the lecture on the given date. There will be NO “make-up” quiz if you miss any of these. They will be held in lecture room.
- Exams: Exam 1 and 2 are each 110 minutes long and worth 25% each. Both will be held in the lecture room.

The schedule for the quizzes and exams will be posted on the course web page. The quizzes and exams are closed book.

Intellectual Integrity:

The [University Policy on Cheating and Plagiarism](http://www.cmu.edu/policies/documents/Cheating.html) applies. Please read it carefully:
<http://www.cmu.edu/policies/documents/Cheating.html>

Students are encouraged to discuss class material in order to better understand concepts and prepare for tests. Students are also allowed to discuss projects to gain an understanding of the general solution direction.

Problem sets (Homeworks) : Students are encouraged to discuss problem sets to better understand concepts and prepare for tests. However, the homework submission itself must be the author's own work. What this means in practice is that students are welcome to discuss problems and solution approaches, and in fact can communally work solutions

at a board. However, the material handed in must be prepared starting with a clean sheet of paper (and the author's recollection of any solution session), but not refer to any written notes from other students during the writing of the solution.

Quizzes and exams : While students are encouraged in discuss with each other to understand the class material PRIOR to tests, absolutely no discussions are allowed DURING any of the quizzes or exams. Further, quizzes and exams are closed book, and no written reference material is allowed for these, unless we explicitly specify otherwise.

Projects : Students are allowed to discuss projects with each other to gain an understanding of the general solution direction. However, each project must be the product of individual student effort. In particular, you cannot reuse code written by anybody else. You are welcome to use any code that the TAs explicitly provides you.