



Stevens Institute of Technology

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Syllabus

CPE 679ws, CS 667ws, NIS 679ws: Information Networks II

Overview

In Information Networks I, the focus of the material studied was the “local” internet – that is the packet flow over a relatively small network such as within an office park or over a coaxial cable used to deliver TV signal as well as high speed internet service. The focus of the material in Information Networks II will be the “global” internet – how data is processed as it flows across the country or across the globe. This will lead to the study of the Network Layer and the Transport Layer (as defined on p. 49 in Tanenbaum’s book). These are the layers that need to deal with routing, addressing, congestion, congestion control, QoS (quality of service), UDP and TCP/IP. In addition, other related topics such as presentation formatting, domain name implementation, e-mail and network management will be covered.

Most of the course will focus on Chapters 5 and 6 in Tanenbaum and Chapters 4, 5, and 6 in Peterson and Davie (plus other sections). At the end of the course, two current applications in the field: Voice over IP (VOIP) and Wireless Sensor Networks will be studied.

Prerequisites

Information Networks I (CPE 678ws, CS 666ws, NIS 678ws)

Learning Goals

After taking this course, the student will be able to:

- Understand internet addressing schemes (IPv4 and IPv6)
- Understand the algorithms employed for routers to autonomously select packet routes
- Design a TCP/IP network using the basic hardware and software components studied

Pedagogy

The course will employ lectures that are posted on the course Web site every week. The lectures will include a new homework assignment and the solution to the previous week’s assignment. Communication via e-mail and discussion groups is encouraged both between students and with the instructor.

Required Text(s)

1. Andrew Tanenbaum, *Computer Networks*, Fourth Edition, Prentice Hall, 2003, ISBN 0-13-066102-3
2. Larry L. Peterson and Bruce S. Davie, *Computer Networks – A Systems Approach*, Third Edition, Morgan Kaufmann, 2003, ISBN 1-55860-832-X

Required Readings

Readings will be assigned for each week. These will be part of the weekly homework assignments.

Assignments

Schedule Highlights:

Weekly Quizzes (approximately 1 hour) distributed and timed by WebCT

Two Exams and the Final Exam are distributed via e-mail – usually on Friday and must be completed by the following Tuesday morning. No quizzes are given the weeks when the Exams and the Final Exam are scheduled.

Homework is assigned every week and the solution is presented the following week. The homework is not collected or graded. Collaboration on the homework among students and/or the instructor is encouraged. All quizzes, exams and the final must be taken individually, of course, without any input from others.

Evaluation

Pick the best grades from 2 out of the 3:

Ten Weekly Quizzes each worth 2.5 points (25%) or

One hour Exam A (25%) or

One hour Exam B (25%)

plus

Final (50%)

A combination of absolute and relative grading is used.

A for point score of 80-100

B for point score of 65- 79

C for point score of 50-64

F less than 50

Or

A is top 20% of class

B is middle half of class

C or F depending on grade distribution of remaining grades

(Instructor's call as to which will be used.)

Course Outline

Lecture 1. :

- a. LAN review – Ethernet and data link layer (DLL)
- b. Bridges and switches
- c. Internetworking issues

Lecture 2. :

- a. Routing – part I
- b. Virtual circuits

Lecture 3. :

- a. Routing – part II
- b. IP protocol and addressing

Lecture 4. :

- a. Routing – part III
- b. Global internet
- c. Multicasting
- d. Multiprotocol Label Switching (MPLS)

Lecture 5. :

- a. Review of internetworking and the network layer
- b. EXAM A (L1 – L4)

Lecture 6. :

- a. Resource allocation
- b. Queuing disciplines

Lecture 7. :

- a. Congestion control
- b. Congestion avoidance

Lecture 8. :

- a. User Datagram Protocol (UDP) and Transmission Control Protocol (TCP)
- b. Connection establishment and termination
- c. Transport layer services and protocols

Lecture 9. :

- a. Remote Procedure Calls (RPC)
- b. Additional congestion control issues
- c. Exam B (L5 – L8)

Lecture 10.:

- a. Asynchronous Transfer Mode (ATM) cells
- b. Extended Markup Language (XML)
- c. Domain Name Hierarchy
- d. Quality of Service (QoS)

Lecture 11.:

- a. E-Mail
- b. Simple Network Management Protocol (SNMP)
- c. Multimedia applications

Lecture 12.:

- a. Overlay networks
- b. Introduction to video (compression, on demand)

Lecture 13.:

- a. Current topics of interest:
 - i. Voice over IP (VoIP)
 - ii. Wireless sensor networks
- b. Final examination