CS 265 **Computer Networks** **Spring 2004**

Course Syllabus

Instructor: Robert R. Snapp, 353 Votey Bldg., 656–0735, snapp@cs.uvm.edu.

Office Hours: M 1:30–2:30 p.m., Th 1:30–3:00 p.m., F 11:00 a.m.–12:00 noon, and by appointment.

Graduate Teaching Fellow: Tao Wang, office hours: *TBA*. twang@cs.uvm.edu

Lectures: MWF 10:10–11:00 a.m., in 367 Votey Bldg.

Web Page: www.cs.uvm.edu/~snapp/cs265.html

Description: Introduction to the principles of computer networks and client-server computing. Topics include local area networks, the internet, ATM technology, TCP/IP programming.

Textbooks: James F. Kurose & Keith W. Ross, *Computer Networks: A Top-Down Approach Featuring the Internet*, Addison-Wesley, Boston, 2004, ISBN 0–201–97699–4 (*required*).

Prerequisites: CS 101, 104, Stat. 151. (Math 173 is recommended.)

Grading Policy: For undergraduate students, the course grade is based on homework assignments (1/3), an two in-class midterms (1/3) and a term project (1/3). Letter grades will be assigned (approximately) as follows:

Range	Letter Grade
90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Homework: Approximately ten exercises will be assigned each week, including an occasional programming assignment. Programs should be written in java. All work will be graded on correctness and style, i.e., clarity and efficiency. Programs should run under Solaris 8.0 on any Sun workstation, e.g., mansfield.emba.uvm.edu.

Midterm Exam: There will be two 50 minute, in-class examinations, the first on **Friday, March 5**, and the second on **Friday, April 30**. Each exam will cover all the material discussed from the beginning of the course, up to one week before the exam. You may bring one 8.5-by-11 inch (double-sided) sheet of notes, and a calculator, to each exam. Otherwise, exams are closed notes, closed books.

Final Exam: There is no final exam for this course. However, class will meet during the final exam session, **Tuesday, May 11, 2004, 8:00–11:00 a.m.**, for project presentations.

Course Projects: Each student is required to complete a individual term project that investigates an approved topic in computer networks. Each project contains three parts:

1. On **February 27, 2004**, a 2–3 page, typed **project proposal** is due. The proposal should describe your topic and its relation to computer science; summarize what you have accomplished to date; describe what you intend to accomplish during the remaining seven weeks; and list at least three *scholarly* books or articles. If relevant, describe any software that you intend to create. (10%);

2. During the final exam period (Tuesday, May 11, 8–11 a.m) each student will offer a ten-minute **oral presentation** of their project to the class (30%)

3. Also, during this period (Tuesday, May 11, 8–11 a.m), a 10–25 page **formal report** is due. It should describe your project in concise detail. (The suggested page range is exclusive of code: if you wrote some original software, please include it in a separate appendix.) The report should be clearly written, and will be graded on originality, correctness (including spelling and grammar), effort, and clarity. (60%)

Projects can be experimental, theoretical, or both. Client/server applications that do not analyze network performance, or test new protocols, are discouraged. Here are a couple ideas to get you started:

1. Present a comparison of different multicasting algorithms.

2. Create a stochastic simulation of the communication traffic in your favorite network, e.g. a distributed queue dual bus (DQDB). Compare the empirical performance with a theoretical model.

Late Assignments: Any work turned in late, without a valid excuse, will be penalized 10% credit each calendar day. Students entitled to special accommodation must notify the instructor by the second week of the semester.

Academic Honesty Policy

This course will adhere to the university policy on academic honesty, described at

www.uvm.edu/~uvmppg/ppg/acad/other/honesty.htm.

Students may only collaborate on homework assignments; however each student is required to turn in his or her own work. (Papers that share a strong degree of similarity will be reported to the Coordinator of Academic Honesty.) Students may be asked, from time-to-time to explain their solutions to the rest of the class. The course project must be completed independently.

Topics

The numbers in parentheses estimate the number of lectures for each unit. The horizontal line (approximately) delineates the material covered by each midterm exam.

1. Introduction (4)
   (a) Circuit switching and modulation
   (b) Packet switching networks
   (c) Theoretical/experimental performance
   (d) Protocol layers
2. Application Layer (6)
   (a) HTTP, FTP, SMTP, DNS
   (b) Socket programming (TCP, UDP).
3. Transport Layer (6)
   (a) UDP
   (b) Go-Back-*N* and TCP
   (c) Congestion control

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4. Network Layer and Routing Algorithms (8)
   (a) Link-state and distance-vector algorithms
   (b) IP protocol
   (c) RIP, OSP, BGP
   (d) Multicast routing
   (e) Mobile IP
5. Link Layer (8)
   (a) Error detection
   (b) MAC addresses
   (c) Ethernet
   (d) Hubs, bridges, switches
   (e) Wireless Ethernet and Bluetooth
   (f) PPP
   (g) ATM, X.25, and Frame Relay
6. Queues, QoS, and multimedia (8)

References on Reserve

1. Bertsekas, D. and R. Gallager, *Data Networks*, 2nd edition, Prentice-Hall, 1991.
2. Jain, Raj, *The Art of Computer Systems Performance Analysis*, Wiley, 1991.
3. Perlman, R., *Interconnections: Bridges, Routers, Switches, and Internetworking Protocols*, 2nd edition, Addison-Wesley, 1999.
4. Peterson, L. L. and B. S. Davie, *Computer Networks: A Systems Approach*, 3rd edition Morgan-Kaufmann, 2003.
5. Stevens, W. Richard, *TCP/IP Illustrated*, vols. 1, 2, & 3, Addison-Wesley, 1993, 1995, 1996.
6. Stevens, W. Richard, *Unix Network Programming*, 2nd edition, vols. 1 & 2, Prentice-Hall, 1998, 1998.
7. Tanenbaum, A. S., *Computer Networks*, Fourth edition. Prentice-Hall, 2002.
8. Walrand, Jean and Pravin Varaiya, *High-Performance Communication Networks*, 2nd edition Morgan-Kaufmann, 2000.