UNIVERSITY OF DELAWARE
DEPARTMENT OF COMPUTER & INFORMATION SCIENCES

CISC 852-010: Computer Network Performance

Spring Semester, 2008
Tue and Thu, 12:30 - 1:45 pm
Smith 102A

Professor: Adarsh Sethi
Office: 448 Smith Hall
Phone: 831-1945
Email: *sethi@cis.udel.edu*
Office Hours: Thu, 9 - 11 am,
and by appt.

Goals:

This course provides a broad background in queuing theory fundamentals and their application to the performance analysis of computer networks and network protocols. A student completing this course should have a working knowledge of basic queuing theory concepts and be able to apply this knowledge to model the class of systems encountered in computer hardware, software, and networking applications.

Required Background:

CISC 650 (Computer Networks) and some background in probability theory. Good calculus skills are assumed. This is an advanced graduate course that requires commensurate mathematical ability and aptitude.

Textbook:

Queuing Systems, volume I: Theory by Leonard Kleinrock, John Wiley and Sons, 1975.

The text will be supplemented by material from other books, from the web, and by readings from journal and conference papers.

Course Contents:

1. Introduction to modeling techniques.
2. Review Topics - Probability theory, use of transforms.
3. Stochastic processes - Markov chains, Birth-death processes.
4. Markovian queues in equilibrium - The M/M/1 queue and variations, Erlangian arrivals and service times.
5. The M/G/1 queue - Distributions of number in system and waiting time, Priority Queuing.

6. Open and closed queuing networks.

7. Multiaccess Communication: Slotted Multiaccess and the ALOHA System, Carrier Sensing, Multiaccess Reservations, CSMA/CD.

8. Advanced Topics and Applications: Some applications to networking such as Flow and Congestion Control, Analysis of ARQ Protocols, Multipath Routing, etc. will be integrated with the study of queuing theory topics above. Additional topics, such as Capacity and Topological Design of Networks, Optimal Routing, and Internet Traffic Models, may be covered at the end, if there is time.

Course Structure:

The course grade will have two main components:

- Homeworks (65%): There will be 6-8 homeworks distributed throughout the semester. The homeworks will involve queueing theory concepts and networking applications. Each homework will be due on the assigned date; late submissions will be accepted up to a maximum of one week late and will be penalized 10% for each day late (not counting weekends and holidays).

- Final Exam (35%): To be held during Finals Week (date and time to be announced). The Final Exam will cover the whole semester's syllabus and will be open-book open-notes.

Grades will be assigned on a relative basis based on the weights listed above. Subjective factors that may also affect your grade include class attendance and participation in discussions.

The computing accounts for this course are located on strauss with Project Number 2116. This course will also use the University of Delaware's MyCourses Course Management System (previously called WebCT). This course syllabus, and some of the homework assignments and projects (where feasible) will be made available on MyCourses. That site also contains pointers to textbooks and online material that will be helpful. In addition, course grades will be posted on this site. The MyCourses site is: *http://www.udel.edu/mycourses* You can log in to the site using your strauss login id and password.

Policy on Academic Honesty:

You are expected to know and abide by the University's policy on Academic Honesty found in the Official Student Handbook and also available on the Web at

`http://www.udel.edu/stuguide/07-08/code.html#honesty`

The Code of Conduct listed therein applies to this course. Additionally, the following specific requirements will be expected in this class. All homeworks and projects are individual assignments, and group work is not permitted, unless otherwise specified. Although general discussions on course material and conceptual ideas are acceptable (and even encouraged), any cooperation on homeworks and projects is not. Students are not permitted to access or compare any answers or code with those of any other student. For both homeworks and projects, looking at another person's work or comparing answers or code before submitting one's work is considered cheating. If any students are suspected of violating this policy, they will be prosecuted according to University guidelines. This applies both to the student who gets answers and the student who gives answers. If you have any questions about the policy as it applies to this course or to any specific situation in the course, I encourage you to come and talk to me.