UNIVERSITY OF DELAWARE
DEPARTMENT OF COMPUTER & INFORMATION SCIENCES

CISC 852-010: Computer Network Performance

Spring Semester, 2020
Tue and Thu, 9:30 - 10:45 am
Room: TBA

Professor: Adarsh Sethi
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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. Learn how to do performance modeling and evaluation of network protocols.

This course may be used as an elective by Computer Science and Electrical & Computer Engineering graduate students. It also satisfies the 800-level requirement for CS students.

Required Background:

CISC 650 or ELEG 651 (Computer Networks II) or equivalent, or instructor permission. Some background in probability theory is required. Good calculus skills are assumed. This is an advanced graduate course that requires commensurate mathematical ability and aptitude.

Textbook:

Performance Modeling and Design of Computer Systems by Mor Harchol-Balter. Cambridge University Press, 2013.

The text may 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: ALOHA Protocol, Carrier Sensing (CSMA), 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.

Course Structure:

The course grade will have two components:

- Homeworks (70%): There will be 6-8 homeworks distributed throughout the semester. The homeworks will involve queueing theory concepts and networking applications.
- Final Exam (30%): The Final Exam will be held during the Finals week and the exact date and time will be announced later. The Final Exam will cover the whole semester's syllabus and will be open-book open-notes.