OR 647: Queueing Theory
Spring 2011
Course Overview

We are all familiar with waiting in lines – in the grocery store, on the telephone, at the airport, on the road. Queueing theory is the mathematical study of lines. Fundamental questions in queueing theory are:

- For a given system, what are the stochastic characteristics of delay? For example, what is the average delay? What is the probability that delay exceeds some threshold? What fraction of customers are turned away?
- What system capacity (e.g., what number of servers) is needed to achieve a specified quality of service?

Answers to these questions provide decision makers a way to efficiently allocate resources to reduce delay. This course provides a survey of quantitative models used to analyze queueing systems. The focus is both on mathematical analyses of such models as well as practical issues in using such models to represent real problems.

The course assumes prior knowledge of calculus-based probability. Knowledge of continuous-time Markov chains (CTMCs) is very helpful, but not required (key aspects of CTMCs will be presented *briefly* in class). The pre-requisite for this course is OR 542 (Stochastic Models), or STAT 544 (Applied Probability), or permission of the instructor.

Class Hours: Monday, 7:20 pm – 10:00 pm, Innovation Hall, room 211
Pre-requisites: OR 542, or STAT 544, or permission of instructor

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Textbook: Gross, D., Shortle, J., Thompson, J. Harris, C. 2008. *Fundamentals of Queueing Theory*, 4th ed., Wiley, Hoboken, NJ.

Student Evaluation Criteria

Homework	15%
Project	15%
Midterm	35%
Final exam	35%

OR 647 Schedule

Last updated 1/11/11

Date	Lecture Topic	Assignments
Jan. 24	Introduction to queueing theory Review of stochastic processes	
Jan. 31	Little’s law	
Feb. 7	Simulation of queueing models	Hmwk #1 due
Feb. 14	Fluid models	
Feb. 21	Simple Markovian queues	Hmwk #2 due
Feb. 28	Simple Markovian queues	
Mar. 7	Advanced Markovian queues	Hmwk #3 due
Mar. 14	** Spring Break **	
Mar. 21	** Midterm **	
Mar. 28	Advanced Markovian queues	Mini-project due
Apr. 4	Queueing networks	Hmwk #4 due
Apr. 11	Queueing networks	
Apr. 18	Models with general distributions	Hmwk #5 due
Apr. 25	Models with general distributions	
May 2	Advanced topics Review	Hmwk #6 due Mini-project due
May 9	** Reading Days ** (no class)	
May 16	** Final Exam **, 7:30 pm – 10:15 pm	