Course Syllabus
EE 549 – Queueing Theory
USC, Spring 2009

I. COURSE INFORMATION

Instructor:
Michael J. Neely (EEB 520, mjneely@usc.edu, 213-740-3505)
Office Hours: Monday/Wednesday 1:30-3:00pm (EEB 520)

Teaching Assistant:
TBA
Office Hours: TBA

Class Location and Time:
OHE 100C, Monday/Wednesday 9:30am-10:50am

Electronic Documents and DEN:
Electronic documents for this course will be routinely available on the DEN website: http://den.usc.edu/

Textbook:
This course will use a combination of instructor handouts, lecture notes, and the following textbook:
• Introduction to Probability Models by Sheldon Ross (8th edition)

For students interested in supplemental reading, the following queueing theory texts are recommended (but not required):
1) Chapter 3 of Data Networks by D. Bertsekas and R. Gallager (Little’s Law, Reversibility, and M/G/1 systems)
2) Discrete Stochastic Processes by R. Gallager (Renewal Theory and Markov Chains)
3) Queueing Systems, Vol. 1, by L. Kleinrock (M/G/1, G/M/1 systems, transients, transform methods)

Grading:
There will be problem sets, 2 mid-terms, and a final exam, to be weighted in an overall score as follows:
• Homework/Participation: 10%
• Midterm 1: 27%
• Midterm 2: 27%
• Final: 36%

The following minimum letter grades are guaranteed to students scoring within the specified intervals:
75-100 A, 70-75 A-, 65-70 B+, 55-65 B, 50-55 B-, 45-50 C+, 35-45 C, 30-35 C-

The above thresholds may be adjusted at the end of the semester at the discretion of the instructor. Any such adjustments will be in favor of a higher letter grade. Class participation may also factor into the homework score. There may be occasional pop quizzes given in class, worth points toward the homework/participation score.

Assignments:
The midterms and final exams from last year can be found here: http://www.rcf.usc.edu/~mjneely/ee549/
You are expected to do these problems, but you will not turn them in. Graded homework will be based on designing your own problems. Specifically, you will design your own problems based on the lecture material from that week. All problems will be scanned into DEN for everyone to see, and you may occasionally be asked to objectively grade someone else’s problem (giving it a score, for example, of 0, 1, or 2).

Exam Dates and Times:
(You are expected to make all of these exam times! Note the extra time allowed for Midterms 1 and 2.)
Midterm 1: Wednesday, Feb. 25, 9:30-11:30am (location TBA)
Midterm 2: Wednesday, April 15, 9:30-11:30am (location TBA)
Final Exam: Friday, May 8, 8am-10am (location TBA)

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Statement for Students with Disabilities:
Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity:
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

Plagiarism (copying or modifying someone else's work and presenting it as your own) and other forms of cheating will not be tolerated. Please ask the TA or instructor if you have questions about proper behavior.

II. Tentative Course Outline:


Sample Path Analysis
Jan. 12, 14 — Rates and the Law of Large Numbers, Renewals, Intro to Queueing Dynamics
Jan. 19 — Martin Luther King Holiday (no classes)
Jan. 21 — Multiplexing and Tracking Theorems
Jan. 26, 28 — Join the Shortest Queue, Rate Stability, Capacity Regions for Networks
Feb. 2, 4 — Leaky Bucket Envelopes, Network Calculus
Feb. 9, 11 — Worst Case Delay Analysis, Traffic Filters, Priority Service
Feb. 16 — President's Day Holiday (no classes)
Feb. 18 — Minimum Clearance Time Problems and IMET
Feb. 23 — IMET for switches, Little's Theorem
Feb. 25 — Midterm 1

Discrete Time Queueing
March 2, 4 — Bernoulli Queues and Steady State Analysis, Markov Chains, Global and Local Balance Equations
March 9, 11 — Coupling, Reversibility, Transform Methods and Tail Behavior
March 16, 18 — Spring Break

Continuous Time Queueing
March 23, 25 — Poisson Process, Random Sampling, PASTA
March 30, 1 — M/M/n systems, Finite buffer systems
April 6, 8 — Continuous Time Reversibility, Jackson Networks, Inspection Paradox
April 13 — Renewal Theory and M/G/1 Queues
April 15 — Midterm 2
April 20, 22 — Queues with Vacations, Busy Periods
April 27, 29 — Equivalent Models for Tree Networks, Special Topics
May 8 (Friday) — Final Exam (8am - 10am)

Note: I may need to reschedule one or two classes (and the corresponding office hours) due to conference travels this semester. The rescheduled class date/time will be announced in advance. You are encouraged to attend, and the lecture will also be taped on DEN for those who are unable to attend.