

CMPE 547 Queueing Networks for Computer Applications (Spring 2008)

- Instructor:** Asst. Prof. Dr. Doğu Arifler
Phone: 630-1192, e-mail: dogu.arifler@emu.edu.tr
- Office Hours:** TBA
- Textbook:** K. S. Trivedi, *Probability and Statistics with Reliability, Queueing and Computer Science Applications*, 2nd ed., Wiley, 2002.
- Prerequisite:** No official prerequisite. However, you **must** have a strong background in elementary probability theory. Knowledge of integral transforms is a plus.

The primary objective of this course is to introduce fundamental concepts of the queueing theory and its applications in analyzing computer systems and communication networks.

Catalog Description: Basic probability and statistics overview, transforms, discrete- and continuous-time Markov chains, steady-state solutions of Markov chains, queueing systems, queueing networks and their applications in computer systems.

Related Courses: You may also consider taking *EE 571 Probability Theory and Stochastic Processes*, *CMPE 542 Advanced Networking*, *CMPE 548 Analysis of Computer Communication Networks*, and *CMPE 576 Advanced System Simulation* in conjunction/in the sequel.

Important Dates: Midterms: 4–12 April 2008, Finals: 27 May–14 June 2008.

Grading Policy: Midterm 40%, Final 40%, Homework 20%

Make-Up Policy: Only one **comprehensive** make-up examination will be given to those who miss any of the midterm or the final. The make-up exam will be given to only those who provide a valid excuse in writing within the next three working days following the missed exam. This rule is a University by-law, and I **will** enforce it. Students who miss an exam due to a serious medical condition are required to provide official documentation (doctor's report approved by the Student Health Center). However, eligibility to take the make-up exam will still be **subject to my approval**.

Academic Dishonesty: Any conduct that attempts to gain unfair academic advantage is considered academic dishonesty. Copying assignments, cheating during exams, substituting for another person are some examples of academic dishonesty. Cases of academic dishonesty **will not** be tolerated and will be punished according to EMU's disciplinary policies.

Tentative outline: Below is a tentative outline for this course. I reserve the right to adjust the pace and topics of the class as the semester progresses.

Week 1	Probability models, sample space, events, axioms (Ch. 1)
Week 2	Random variables, expectation (Ch. 2, 3)
Week 3	Transform methods, conditional distributions (Ch. 4, 5)
Week 4	Stochastic processes: the Bernoulli, Poisson, and renewal processes (Ch. 6)
Week 5	Discrete-time Markov chains: n -step transition probabilities, limiting probabilities (Ch. 7)
Week 6	Discrete-time Markov chains: Embedded chains and the M/G/1 queueing system (Ch. 7)
Week 7	Continuous-time Markov chains: Chapman-Kolmogorov equations, limiting probabilities (Ch. 8)
Week 8	Midterm week
Week 9	Continuous-time Markov chains: Birth-death processes, queues (Ch. 8)
Week 10	Erlang loss and delay models (Ch. 8)
Week 11	Open queueing networks, product-form solutions (Ch. 9)
Week 12	Closed queueing networks, mean-value analysis (Ch. 9)
Week 13	Queues with correlated arrivals (if time permits)
Week 14	Review and concluding remarks

Additional references:

- D. Bertsekas and J. Tsitsiklis, *Introduction to Probability*, Athena Scientific, 2002.
- L. Kleinrock, *Queueing Systems*, vol. 1 & 2, Wiley, 1975-76.
- Henk C. Tijms, *A First Course in Stochastic Models*, Wiley, 2003.