CMPE 547 Queueing Theory for Computer Applications (Spring 2019)

Instructor:	Prof. Dr. Doğu Arifler Phone: 630-1192, e-mail: dogu.arifler@emu.edu.tr
Office Hours:	TBA
Textbook:	J. F. Shortle, J. M. Thompson, D. Gross, and C. M. Harris, *Fundamentals of Queueing Theory*, 5th ed., Wiley, 2018.
References:	M. Harchol-Balter, *Performance Modeling and Design of Computer Systems: Queueing Theory in Action*, Cambridge University Press, 2013. (Highly Recommended) L. Kleinrock, *Queueing Systems*, vol. 1 & 2, Wiley, 1975-76.
Prerequisite:	No official prerequisite. However, you **must** have a strong background in elementary probability theory.

The primary objective of this course is to introduce fundamental concepts of stochastic modeling, queueing theory, and their 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: Midterm: 10 April 2019, Final: 29 May 2019.

Grading Policy: Midterm 50%, Final 50%.

Make-Up Policy: Only one **comprehensive** make-up examination will be given for a missed midterm or final **only under exceptional/extenuating circumstances** (e.g., hospitalization, loss of a close relative, etc.). In these cases, students must submit a petition with related official reports to me within the next three working days following the missed exam. Note that minor ailments are not considered as exceptional/extenuating circumstances. Eligibility to take the make-up exam will be **subject to my final 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.

Weeks 1–2	Introduction to queueing processes
Weeks 3–4	The Poisson process and the exponential distribution
Weeks 5–6	Markov Chains: discrete-time and continuous-time
Week 7	Introduction to Markovian queueing models
Weeks 8–9	Midterms
Weeks 10–11	Markovian queueing models (Delay and Loss Models)
Weeks 12–13	Networks of queues
Week 14	The M/G/1 queue

Additional references for probability and stochastic processes:

- D. Bertsekas and J. Tsitsiklis, *Introduction to Probability*, 2nd ed., Athena Scientific, 2008.
- R. D. Yates and D. J. Goodman, *Probability and Stochastic Processes: : A Friendly Introduction for Electrical and Computer Engineers*, 3rd ed., Wiley, 2014.
- Henk C. Tijms, *A First Course in Stochastic Models*, Wiley, 2003.