SIE 520 Stochastic Modeling I

Spring 2025

Class meeting times & location:
MW 3:05pm – 4:20pm, ENGR 301

Instructor: Prof. Pavlo A. Krokhmal
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Office hours: MW 2:00pm – 3:00pm, or by appointment

Textbooks:

- Ross, S. *Stochastic Processes*, (2nd edition), Wiley & Sons, 1996 (Reference)
- Resnick, S. *Adventures in Stochastic Processes*, Birkhäuser, 1992 (Reference)
- Kulkarni, V. *Introduction to Modeling and Analysis of Stochastic Systems*, (2nd edition), Springer, 2010 (Reference)

Prerequisites: SIE 321 *Probabilistic Models in Operations Research;* a working knowledge of probability.

Course objectives:

- To develop a fundamental understanding of stochastic process models
- To improve the ability to analyze stochastic systems
- To apply probabilistic models in engineering, finance, public policy, etc.

Course topics:

- Probability theory (convergence properties, limit theorems, probability inequalities)
- Markov chains (modeling, transition probabilities, stationary distributions)
- Renewal theory (elementary/key renewal theorem, renewal reward processes)
- Poisson processes (memoryless property, arrival times, filtered process, non-homogenous Poisson processes)

Computer Support: PC with internet access. All class materials, including lecture notes, assignments, etc., will be distributed via course's D2L website (https://d2l.arizona.edu). Class announcements will also be posted on D2L and/or distributed via D2L email classlist.

Assignments: Homework (30%), Midterm Exam (35%), Final Exam (35%).

There will be about six homework assignments in total. Discussion is allowed and individual submission is required. To ensure fairness, it is required that students submit their homework on time, and not ask homework questions before submitting the homework.

Tentative dates of the midterm and final exams:

- Midterm Exam: Wednesday, March 19 (in class).
- Final Exam: Tuesday, May 13 (3:30 – 5:30pm).

Exam policy is closed-book and closed-notes, and students are allowed to bring one letter-sized "cheat sheet". Only calculators are allowed on exams, no laptops, smartphones, or tablets. Final exam is not cumulative.

Grading:
A: 90.00 – 100.00
B: 80.00 – 89.99
C: 70.00 – 79.99
D: 60.00 – 69.99
E: 0 – 59.99

Late Assignments: No credit for assignments submitted late.

Attendance Policy: Students are expected to attend class. If you miss class you are responsible for obtaining the class notes, assignments, and announcements. Phone usage is not allowed during the class; please put your phone into "quiet", or "vibrate" mode prior to start of the class.

Accommodation for Students with Special Needs: Students with disabilities or special needs for accommodations (including in class meetings and exams) are required to contact both the instructor and the S.A.L.T. Center (www.salt.arizona.edu) or the Disability Resource Center (http://drc.arizona.edu) as early as possible in the semester. They are also required to submit appropriate documentations to the instructor before accommodations could be offered.

Academic honesty: All students are expected to commit themselves to be honest in all academic work and understand that failure to comply with this commitment will result in disciplinary action. This is a reminder to uphold your obligation as a UA student and to be honest in all work submitted and exams taken in this course and all others.

This syllabus is tentative and the instructor reserves the right to make modifications if appropriate.