

MA/STAT 532. Elements of Stochastic Processes.

Spring 2002. Tu Th 10:30-11:45, MATH 215

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Office hours: Tu Th 12:00 - 2:00 MATH 504, or by appointment.

Required Textbook: Sheldon Ross. *Stochastic Processes*, Second Edition. Wiley, 1996.

Prerequisite / Suggested preparation: MA/STAT 519: A non-measure theoretic mathematical introduction to probability theory at the Master's level.

Course description. This course will closely follow a good portion of the textbook, which is an introduction to various types of stochastic processes, including a wide variety of applications. Chapters 1 to 4 will be covered in detail (Poisson processes, renewal theory, queueing theory, Markov chains); as time allows, we will dedicate a significant portion of the course to Chapters 6 and 8 (Martingales, Brownian motion), complementing the material with a systematic introduction to stochastic calculus and stochastic differential equations. Chapters 5, 7, 9, and 10 will probably be omitted. Still, the minimal amount of material to be covered is fairly ambitious. Although full proofs of theorems will be presented, and rigor is expected in answers to all homework assignments and exam problems given the results that are covered in class, the emphasis will be on understanding the concepts and why they are true, not on extreme mathematical rigor. This is why measure theory is not required for this class; this also explains how so much material can be covered in one semester.

Performance Evaluation and Grading Scheme.

Homework (20%). Homework will be assigned regularly. While it is acceptable to work in groups on homework problems, each student must turn in a separate assignment, and identical solutions are NOT acceptable. Your homework must reflect YOUR understanding of the material. Some of the homework problems are quite difficult, and are designed to help you think hard about the subject; you will learn a lot by doing them.

In-class examinations (15 * 4 = 60%). There will be 4 in-class exams, each worth 15% of your grade, each 60 to 75 minutes in duration. The exact dates will be announced at least a week in advance, and may depend on the progress made by the class. The first in-class exam is tentatively set for Feb 12. See the note below about plagiarism¹, which will not be tolerated.

Take-home final exam (20%). You will have several days to complete the final exam, which will be due sometime during finals week. Unlike homework assignments, you may not discuss the final exam with anyone; signs of collaboration or plagiarism¹ will be dealt with harshly.

¹Plagiarism is the act of presenting someone else's work as your own. This includes finding the answer to a given problem in a book, in someone else's assignment, or requesting the answer from someone, and copying from it. Contrary to popular belief, a correct solution to a given mathematical problem is almost never unique, and plagiarism in a mathematical assignment is very easy to detect.