

MA/STAT 532 - ELEMENTS OF STOCHASTIC PROCESSES

Spring 2012
MWF 9:30-10:20, REC 114

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Office Hours: Monday 3:00-4:00, Wednesday 2:00-4:00

Text: *Essentials of Stochastic Processes* (2nd Edition - beta version), by Rick Durrett.
Available for purchase at the Boiler Copy Maker in the Purdue Memorial Union (\$16.25)

Supplementary Texts:

Introduction to Stochastic Processes, by Greg Lawler

Adventures in Stochastic Processes, by Sidney Resnick

Course website: <http://www.math.purdue.edu/~peterson/Teaching/532/>

Grades will be available online through the blackboard website for the course.

Prerequisites: The main prerequisite is a basic introductory course in probability. Students should be familiar with independence, conditional probability/expectations, the law of large numbers, the central limit theorem, and common discrete and continuous probability distributions (especially Binomial, Geometric, Exponential, and Gaussian/Normal).

Students must also have enough mathematical maturity to be comfortable following proofs in the textbook and in lectures, and must also be able to construct proofs of their own on homeworks and tests.

Course content:

A basic course in stochastic models, including discrete and continuous time Markov chains and Brownian motion, as well as an introduction to topics such as Gaussian processes, queues, epidemic models, branching processes, renewal processes, replacement, and reliability problems.

We will cover chapters 1–4 of the text which include the following topics:

- Markov chains (discrete time) - Chapter 1
 - Classification of states
 - Limiting behavior
- Poisson processes - Chapter 2
- Renewal processes - Chapter 3
- Markov chains in continuous time - Chapter 4

Depending on how much time remains, we will also cover Martingales (chapter 5), Financial modelling (chapter 6), and/or Brownian motion.

Grading and Assignments:

Homework (20%)

The lowest homework score will be dropped at the end of the semester. Collaboration on homework assignments is allowed and in fact encouraged, but each student is expected to write up his/her own solution.

Tests (40%)

There will be two midterm exams during the semester. The exams will be most likely be some time during the weeks of February 20-24 and April 9-13, respectively.

Final Exam (40%)

The final exam will be cover the entire course.

Homework instructions: The homework problems are graded mainly on your reasoning. Part of doing good mathematics is explaining your reasoning in a way that is easy to understand. *It is **your** responsibility to provide a clear explanation to the grader.*

In addition, please follow these rules when handing in homework:

- Be neat. Recopy problems if necessary.
- Put in problems in the correct order.
- Staple your pages together, and don't use paper torn out of a notebook.

Disclaimers:

- Cheating/plagiarization will not be tolerated. Instances of academic misconduct will lead to disciplinary action such as a 0 on the assignment or an F in the course.
- Late homework will not be accepted.
- If you have a conflict with a test date, please let me know early enough so that I can schedule a make-up test.
- This syllabus is subject to change.