Math 413 Winter 2008
Introduction to Stochastic Processes

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Office Hours: MWF 11:00 - 11:50 AM, Th 2:00 - 2:50 PM, and by appointment.

Course Goals: Students will understand basic topics related to stochastic processes, including conditional probabilities and expectations and the uses of conditioning in computations; Markov chains; Poisson processes and non-homogeneous and compound Poisson processes; and Brownian motion. As time permits we may discuss dicrete-time martingales.

Prerequisite: Math 411A or permission.

Required Text: Durrett, *Essentials of Stochastic Processes*, Springer, 2004. Make sure that you have the corrected second printing! To check, read the last couple sentences of the preface. There is an errata list on the author's webpage (just google him) and I strongly encourage you to print a copy and keep it with your textbook.

Chapters Covered: We will use sections of Ross' *Introduction to Probability Models* to talk about conditioning (approximately $1\frac{1}{2}$ weeks). Then we will cover chapter 1 (approximately $2\frac{1}{2}$ weeks), chapter 3 (3 weeks), and chapter 6 along with parts of chapter 2 (2 weeks).

Evaluation:

- Homework (24%).

- Problem session write-ups (6%); see below.

- Two in-class exams (25% each); tentative testing dates: Friday, Feb. 1 and Friday, March 7.

- Take-home comprehensive final exam (20%); due Wednesday, March 12, by 2PM.

Course Conduct:

- **Required Materials:** The textbook is required. You will also want to have at least a scientific calculator.

- **Homework:** Homework will be assigned often in class and due dates will be announced at the time of the assignment. Homework must be done neatly, *stapled*, and written on clean-edged paper. Your work should be clear, in a logical order, and provide sufficient explanation. What's sufficient explanation? A good guide is to think about whether another student in the class who didn't know how to do this particular problem could understand your solution. This will also help you understand your solution later! Credit will not be given for late homework.

- **Problem session write-ups:** We have "problem sessions" each Wednesday for the last 50 minutes or so of class, where instead of covering new material in class you will be given several problems to work on. You are encouraged to work on these with others in the class. At the end of class students will be assigned to write up solutions to each of the problems to be distributed to the rest of the class. You must write up 3 problems over the course of the

quarter, and may not do more than one per week. Problems will be assigned first by taking volunteers among those who still have write-ups to complete and then, if there are no volunteers, choosing among that same group as random. When writing up a solution to a problem, remember that your fellow students are going to be reading it. This means that it needs to be legible – if you have particularly poor handwriting, this might be a good time to learn to typeset mathematics – and provide enough detail that your fellow students can easily follow your solution. English words (or sentences!), pictures, etc. are encouraged. To receive credit, your correct solution is due to me by 11:30 the following Wednesday. Each solution will be worth 2% of your final grade. You are welcome, and in fact strongly encouraged, to discuss your solution with me before it is due, and I will be happy to read drafts, etc. Late solutions will be docked one-half of one percentage point per business day. Credit will not be given until a solution is correct and reasonably well-written. Towards the end of the quarter, if we have extra problems available, you may volunteer to take on additional write-ups for an extra 1% added to your course grade, per problem.

- **Exams:** Any changes to the tentative exam schedule will be announced in advance. Make-up arrangements must be made prior to an exam unless you can document an unexpected circumstance beyond your control that prevented you from taking the exam. Further guidelines for the take-home final will be given at the time of the exam.