ISyE 6761

Stochastic Processes I

Fall 2008

Administrative Info

Instructor: Anton J. Kleywegt
Office: Groseclose 409
Office hours: Monday, Wednesday, Friday 2:00–3:00
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Class Room: IC 209
Class Times: Monday, Wednesday, Friday 1:05–1:55

Description:
This is the first of two courses on stochastic processes. The first course focuses on discrete-time, discrete-state Markov chains, renewal processes, and the Poisson process. The second course covers topics such as continuous-time, discrete-state Markov processes; queueing theory; Brownian motion; martingales; and possibly some other topics. A third course is under development that may cover topics such as convergence of sequences of stochastic processes, and stochastic calculus. The material covered in the first course is fairly standard and varies little from textbook to textbook or from instructor to instructor.

Objectives of the course are

- to develop an ability to model dynamical processes with noise as stochastic processes;
- to develop an understanding of important qualitative characteristics of stochastic processes;
- to develop an ability to analyze some basic stochastic processes;

Prerequisites:
Real analysis, linear algebra, probability

Textbook:
Serfozo, R., *A Course in Applied Stochastic Processes*, 2008.

References:

Asmussen, S., *Applied Probability and Queues*, Springer-Verlag, 2nd. edition, 2003.

Billingsley, P., *Convergence of Probability Measures*, Wiley, 2nd. edition, 1999.

Billingsley, P., *Probability and Measure*, Wiley, 3rd. edition, 1995.

Chung, K.L., *A Course in Probability Theory*, Academic Press, 2nd. edition, 1974.

Dudley, R.M., *Real Analysis and Probability*, Cambridge University Press, 2002.

Fristedt, B. and Gray, L., *A Modern Approach to Probability Theory*, Birkhäuser, 1997.

Karlin, S. and Taylor, H.E., *First Course in Stochastic Processes*, 2nd. edition, 1990.

Karlin, S. and Taylor, H.E., *Second Course in Stochastic Processes*, 1981.

Resnick, Sidney I., *Adventures in Stochastic Processes*, Birkhäuser, 2005.

Ross, S.M., *Introduction to Probability Models*, Academic Press, 8th. edition, 2002.

Ross, S.M., *Stochastic Processes*, John Wiley & Sons, 1996.

Tijms, H.C., *Stochastic Modelling and Analysis: A Computational Approach*, John Wiley & Sons, 1986.

Wolff, R.W., *Stochastic Modeling and the Theory of Queues*, Prentice-Hall, 1989.

Topics Covered:

- Discrete-time Markov Chains
- Renewal Processes
- Poisson Process

Grading:
Grades will be assigned as follows:

- Homework: 30%
- Midterm exam: 30%
- Final exam: 40%

Homework:
Homework will be assigned approximately once every two weeks. You should start working on each homework early, that way you will have time to ask questions in class before the homework is due. Late homework will be accepted only in case of unavoidable occurrences, such as illness or death in the family. You are encouraged to discuss homework and learn from each other, but each person must submit his/her own work, unless the homework specifically indicates that you should work in groups. Any queries on homework grades must be submitted in writing to the instructor, together with the homework in question.

Exams:
Exams will cover material discussed in class, as well as self-study assignments and homeworks. The exams will be comprehensive. The midterm exam is scheduled for Monday October 20, 2008, in class. The midterm exam will be closed book. Any queries on exam grades must be submitted in writing to the instructor, together with the exam in question. Missing an exam will be accommodated only in case of unavoidable emergencies, and the instructor must be notified of the emergency as soon as possible. If you cannot take an exam at the designated time or in the designated way, you should make alternative arrangements with the instructor as soon as possible.

Academic Honor Code:
It is your responsibility to familiarize yourself with the Georgia Tech Honor Code that can be found at `<www.honor.gatech.edu>`. Specifically, you must do your own work in all exams. Cheating off of another persons exam is unethical and unacceptable. Cheating off of anyone elses work is a direct violation of the GT Academic Honor Code, and will be dealt with accordingly. When working on homework, you may work with other students in the class. However; each student must turn in a separate copy of the homework with the following written on it: your name, and the names of everyone you collaborated with. For any questions involving these or any other Academic Honor Code issues, please consult me, the teaching assistant, or `<www.honor.gatech.edu>`.