Statistics 621 – Advanced Stochastic Processes
Section 600, Spring Term, 2011

This is an advanced course in stochastic processes. Topics may vary from year to year. They will include both discrete and continuous time processes and possibly point processes. Martingale theory and Markov theory will play important roles.
Although not completely rigorous, the course will be more mathematical than a first course (such as Statistics 615). Measure theory is not required, but a few measure theoretic concepts will be introduced as needed. The intention is to include a layer of theory that would enhance the student's ability to read the literature and to do research. Homework problems will include both applied and theoretical questions.

Course Information

Time and Place:	MWF 9:10am–10:00am, Blocker 411.
Instructor:	Daren Cline. (http://stat.tamu.edu/~dcline)
Office:	Blocker 459D, 845-1443.
E-mail:	dcline@stat.tamu.edu
Office Hours:	MWF 10:15am–11:30am or by appointment.
Course Web Page:	http://stat.tamu.edu/~dcline/621.html. Lecture notes and homework assignments will be available at this site. Access to them will require a password that I will provide to you.
Text:	(*both are required*) G.R. Grimmett and D.R. Stirzaker, *Probability and Random Processes, 3rd ed.*, Oxford Univ. Press. G.R. Grimmett and D.R. Stirzaker, *One Thousand Exercises in Probability*, Oxford Univ. Press.
References:	(on reserve in Evans Library) R.N. Bhattacharya and E.C. Waymire, *Stochastic Processes with Applications*, Wiley. E. Çinlar, *Introduction to Stochastic Processes*, Prentice-Hall. M. Kijima, *Markov Processes for Stochastic Modeling*, Chapman & Hall. T. Mikosch, *Elementary Stochastic Calculus*, World Scientific. S.I. Resnick, *A Probability Path*, Birkhäuser. S.I. Resnick, *Adventures in Stochastic Processes*, Birkhäuser.
Prerequisite:	Statistics 614 *or* Statistics 615 (or their equivalent). Measure theory is *not* required nor is prior experience with stochastic processes as the presentation will mostly be self-contained. However, this will be a theoretical, Ph.D. level course, so *some exposure to advanced probability such as either 614 or 615 is necessary.*

Course Information (cont.)

Disabilities Help:	The Americans with Disabilities Act ensures that students with disabilities have reasonable accommodation in their learning environment. If you have a disability and need help, please contact me and Disability Services in B118 Cain Hall, 845-1637.
Academic Integrity:	You are expected to maintain the highest integrity in your work for this class, consistent with the university rules on academic integrity. This includes not passing off anyone else's work as your own, even with their permission. Please see the homework and exam policies below for specifics.
Copyright:	All the resources I provide for this course are copyrighted and may not be copied or distributed without my express, written permission.

Grading

Homework:	Homework will be assigned (on the course web page) and collected regularly. Homework is worth 30% of the total term score. *Please see the homework policy below.*
Exams:	One midterm exam worth 30% and a final exam worth 40%. *Please see the exam policy below.*
Exam Dates:	Midterm Exam: TBA. Final Exam: TBA.

Course Policies

Exam Policy: Your exam solutions must be your own work, using only resources I explicitly allow, consistent with the university rules on academic integrity. Each exam will be comprehensive and cumulative.

- Please bring your own paper. I ask that separate problems be on separate sheets.
- Bring resources (such as notes) only if I explicitly allow them.

I will not expect you to quote theorems and results explicitly but I do expect you to demonstrate that you can make use of them. Specifically, you will need to:

- Show all your work. This does not necessarily mean showing every individual algebraic or calculus step – but it must be clear what those steps would be.
- Identify (by number, name or description) any theorems, examples or homework problems you use.
- Clearly identify the solution and/or the end of a proof or derivation.

Course Policies (cont.)

Homework Policy:

Your homework solutions must be your own work, not from outside sources, consistent with the university rules on academic integrity. I expect you to follow this policy scrupulously. Your performance on the exams is much more likely to be better.

You may use:

- Your textbook and notes from class.
- Your notes, homework, etc., from a related class that you took or are taking.
- References listed on the syllabus.
- Discussion with the instructor or grader.
- Voluntary, mutual and cooperative discussion with other students currently taking the class.

You may not use:

- Solutions manuals (printed or electronic) other than what is provided with the required texts.
- Solutions from previous classes.
- Solutions, notes, homework, etc., from classes taught elsewhere or at another time.
- Solutions, notes, homework, etc., from students who took the class previously.
- Copying from students in this class, including expecting them to reveal their solutions in "discussion".

Makeup Policy:

This is based on university policy.

- If you must miss an exam due to illness or circumstances beyond your control, notify me or the Statistics Department, in writing or by email (before, if feasible, otherwise within two working days after you return). See me as soon as possible to schedule a make-up exam.
- An Incomplete grade will be given only in the event that circumstances beyond your control cause prolonged absence from class and the work cannot be made up.

Course Outline (Tentative)

1. **Introduction**
2. **Countable State Markov Processes, Birth-Death Processes, Queueing Models**
3. **Martingales and Submartingales, Random Walks**
4. **Brownian Motion and Diffusion Processes, Itô Integrals**
5. **Point Processes, Poisson Processes** (time permitting)