

# INTRODUCTION TO STOCHASTIC PROCESSES

## SSTA 413 - 001 Spring 2009

**Instructor :** Dr. Bernard Omolo

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**Course homepage:** <http://faculty.uscupstate.edu/bomolo/Spring2009.html>.

**Office hours:** TT 9:25 - 10:25 a.m; other times strictly by appointment.

**Reference text:** Essentials of Stochastic Processes by Rick Durrett (ISBN: 0-387-98836-X).

**Location & Time :** HC 268 10:50 a.m - 12:05 p.m TTH

**Prerequisites:** C or better in SSTA 410 or consent of instructor.

### Course Description

*USC Upstate Catalog Description:* Markov chains; Poisson processes; introductory renewal theory, Brownian motion and stationary processes used in mathematical modeling.

Familiarize yourself with MATLAB if possible. Topics to be covered will be in the following order:

- **Review of probability theory:** brief review of prob theory; generating functions; central limit theorem.
- **Discrete-time Markov chains:** classification of states; basic theorems of Markov chains; stationary probability distribution; finite Markov chains.
- **Poisson processes:** exponential distribution; Poisson processes.
- **Renewal theory:** law of large numbers; some applications.
- **Brownian motion:** Markov property; martingales; option pricing; Black-Stokes formula.

### Course Objective

To provide an introduction to basic concepts of stochastic processes for students with a probability background.

### **Attendance Policy**

- Regular attendance is expected as per university policy. An attendance roll will be taken each class session. Credit will be given for perfect attendance at the end of the semester.
- You will be responsible for all work covered in your presence and absence, including tests and any announcements.

### **Classroom Behavior**

You are expected not to speak in class, unless you are asking the instructor a question or answering one from him. Do not eat in class! Any disruptive behavior in class will not be tolerated and could result in being sent out of class.

### **Assessment Policy**

- Homework problems will be assigned during each class. Some of them will be solved in class. Participation in the solution will earn extra credit.
- We shall have a chapter test for each chapter covered. Make-up tests will be given only with documented excuses.
- The Final Exam grade will replace the lowest test grade..
- Test: 100 points each; Final Exam: 200 points

### **Critical Dates**

Mar 8-15: Spring break (no classes)

Apr 30: Final Exam (comprehensive) 11:30 a.m - 2:30 p.m HC 268

### **Grading Scale**

90-100: **A**;

86-89: **B+**; 80-85: **B**;

76-79: **C+**; 70-75: **C**;

66-69: **D+**; 60-65: **D**;

00-59: **F**.

**Plagiarism / Academic Dishonesty**

Your grade will be based on **your own** work. Cheating in any form is a violation of the Honor Code (available in the student handbook), and will be reported to the Dean of Students. A first offense will result in a zero for the homework/quiz/test. If the offense is not the first (whether in this class or another) the consequence will likely be more severe, including possible failure for the course.

**Accommodation**

Any student who, because of a disabling condition, may require special arrangements in order to meet course requirements should contact the instructor as soon as possible.

**Disclaimer:** This is a tentative syllabus. The instructor reserves the right to make changes as necessary!