EE 503 **Probability for Electrical and Computer Engineers** **Fall 2014**

Course Information and Outline v.1.5
29 August 2014

The deadline to add and drop this class with 100% refund is 12 September 2014
The withdrawal deadline is 14 November 2014

Course Summary: This course covers mathematical and probabilistic descriptions of unpredictable or random phenomena, with applications to many engineering problems. Probabilistic tools are among the most useful for modeling real systems and analyzing system performance. The course provides a solid basis of probability theory and related topics for graduate students in electrical and computer engineering (ECE) and preparation for many ECE graduate classes that require a strong understanding of these topics. The course includes material from first principles in a more rigorous manner than is typically found in undergraduate probability classes in engineering.

Prerequisites: Calculus, linear algebra and matrices

Class Time and Location: Tuesday and Thursday, 10:00 am-11:50 am, OHE 100D
Discussion: Friday, 12:00 noon-12:50 pm, OHE 100D

Instructor: A.A. Sawchuk; EEB 404B; phone: 213-740-4622; fax: 213-740-6618; email: sawchuk@sipi.usc.edu; http://ee.usc.edu/faculty_staff/faculty_directory/sawchuk.htm
Office Hours: Wednesday, 10:00 am-12:00 noon

Teaching Assistant: Yu-Chen (Ethan) Sung; EEB 307; phone: 213-740-4454; email: yuchens@usc.edu
Office Hours: Tuesday and Thursday, 2:30 pm-4:30 pm

Graders: Andi Shen; email: andishen@usc.edu; Nimit Desai; email: nimitdes@usc.edu; location and office hours to be announced

Texts and Readings
The required course textbook is:
Alberto Leon-Garcia, *Probability, Statistics, and Random Processes for Electrical Engineering, 3rd Edition*, Pearson Prentice Hall, 2008.

An optional textbook is:
Sheldon M. Ross, *Introduction to Probability Models, 10th Edition,* Academic Press, 2010.

Handouts and supplementary class notes will be also distributed.

Grading
Your course grade is determined by a process of reasoning. Everyone will receive the highest grade justified by available evidence from the following data:

2 Midterms	= 22.5% each (in class, Thursday, 2 October and Thursday, 6 November)
Final	= 40% (will be given Tuesday, 16 December, 8:00 am - 10:00 am as listed in the USC exam schedule; there are NO exceptions to this date - if you can't take the final at this time, do not enroll in this course)
Homework	= 15% (two lowest average homework grades will be discarded)

DEN students in the local area must come to campus for the exams.

Attendance in class is required. Many examples and applications not in the text will be covered in the lectures.

Homework
Homework will be assigned every week on Thursday, and due the following Thursday. Homework will be graded – solutions are provided on Tuesday following the due date. You can turn in homework late until solutions are posted for full credit. No credit after solutions appear. It is extremely important to keep up with the lectures and to do the homework problems. Many details and applications of the principles are learned by doing problems.

Academic Integrity - Cheating
Cheating or plagiarism will not be tolerated on homework or exams. You may discuss homework problems among yourselves but each person must do their own work. Copying or turning in identical homework sets is cheating. The penalty ranges from F on the homework or exam, to an F in the course, to recommended expulsion. See:

http://viterbi.usc.edu/academics/integrity/
http://www.usc.edu/student-affairs/SJACS/pages/students/academic_integrity.html
http://www.usc.edu/libraries/about/reference/tutorials/academic_integrity/index.phphttp://www.u

If you have any questions regarding academic integrity - see the instructor.

USC Statement on Academic Integrity
USC seeks to maintain an optimal learning environment. General principles of academic honesty include: the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, (www.usc.edu/scampus or http://scampus.usc.edu) contains the University Student Conduct Code (see University Governance, Section 11.00)

Course Content:
Algebra of events – set theory
Sample, event spaces
Probability as a measure in sample space
Combinatorics
Conditional probability and sample spaces
Independence of events
Probability mass and densities
Discrete and continuous random variables
Expectations and moments of random variables
Frequently occurring densities
Discrete and continuous transforms
Poisson, Bernoulli, Markov processes
Gaussian, Poisson distributions
Gaussian random vectors
Functions of random variables
Estimation, statistics
Covariance and correlation
Limit theorems
Stochastic processes
Discrete and continuous time Markov chains
Brief introduction to queueing theory
Engineering applications

Follow-on Classes:
EE 450 Introduction to Computer Networks
EE 512 Stochastic Processes
EE 562a Random Processes in Engineering