EE 503 Probability for Electrical and Computer Engineers Fall 2016

Course Syllabus and Information v.1.2
22 August 2016

The deadline to add or drop this class (with 100% refund) is 9 September 2016
The withdrawal deadline (no refund) is 11 November 2016

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 background in probability theory and related topics for graduate students in electrical and computer engineering (ECE), financial engineering, and other engineering majors. 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 132
Discussion: Friday, 12:00 noon-12:50 pm, OHE 132

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Office Hours: Wednesday, 10:00 am-12:00 noon

Teaching Assistant 1: Xiaohan Wei; EEB 527; email: xiaohanw@usc.edu; office hours: TBA

Teaching Assistant 2: Daoud Burghal; EEB 527; email: burghal@usc.edu; office hours: TBA

Teaching Assistant 3: TBA

Graders: TBA

Texts and Readings
Handouts and supplementary class notes will be distributed.

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.

The following two outline-type books may also be useful. They have many examples and supplementary solved problems:
1. Seymour Lipschutz and Marc Lipson, Schaum's Outline of Probability, Second Edition (Schaum's Outline Series) Paperback
http://www.amazon.com/gp/product/0071755616/ref=wms_ohs_product?ie=UTF8&psc=1

2. Hwei Hsu, Schaum's Outline of Probability, Random Variables, and Random Processes, 3rd Edition (Schaum's Outline Series) Paperback
http://www.amazon.com/Schaums-Outline-Probability-Variables-Processes/dp/0071822984/ref=dp_ob_title_bk

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	= 23.5% each (in class, Tuesday, 4 October and Tuesday, 8 November)
Final	= 40% (will be given Tuesday, 13 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	= 13% (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.

Course Web Site and Email
Make sure your email listed in USC records is up-to-date; I will contact you often by email. The course web site is accessible through https://courses.uscden.net/d2l/home.

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 and submit individual solutions written in their own hand. 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://sjacs.usc.edu/students/academic-integrity/
https://libraries.usc.edu/research/reference-tutorials

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)

Week	Start Date	End Date	Course Topics
1	22-Aug	26-Aug	Algebra of events; set theory; sample and event spaces; probability axioms; independence
2	29-Aug	2-Sep	Conditioning; Bayes rule
3	5-Sep	9-Sep	Counting; combinatorics
4	12-Sep	16-Sep	Sequential experiments; Bernoulli trials, discrete and continuous random variables (RVs) and densities
5	19-Sep	23-Sep	Common densities: Gaussian, Poisson, Cauchy; expectation; moments; two or more RVs
6	26-Sep	30-Sep	2D densities
7	3-Oct	7-Oct	4-Oct-Midterm 1; 2D expectation; covariance; correlation; one function of one RV
8	10-Oct	14-Oct	One function of two RVs
9	17-Oct	21-Oct	Two functions of two RVs; jointly normal RVs
11	24-Oct	28-Oct	Characteristic functions; discrete and continuous transforms
12	31-Oct	4-Nov	Central limit theorem; approximations; bounds
13	7-Nov	11-Nov	8-Nov-Midterm 2; sample mean; laws of large numbers; convergence; parameter estimation
14	14-Nov	18-Nov	Vector RVs; Gaussian random vectors; estimation of RVs
15	21-Nov	25-Nov	24-Nov-Thanksgiving Holiday-no class; estimation of RVs: MAP, ML, MMSE, linear, nonlinear; stochastic processes; discrete time Markov processes
16	28-Nov	2-Dec	1-December-Last day of class; Markov chains
17	5-Dec	9-Dec	Study week - possible review class
18	12-Dec	16-Dec	13-December-Final exam - 8-10 am

Follow-on Classes

EE 450 Introduction to Computer Networks (3)
EE 511 Simulation Methods for Stochastic Systems (1)
EE 512 Stochastic Processes (3)
EE 517 Statistics for Engineers (3)
EE 562a Random Processes in Engineering (3)