Department of Electrical Engineering
University of Southern California

EE 464 — PROBABILITY THEORY FOR ENGINEERS **Spring 2005**

Instructor: Professor Urbashi Mitra, Associate Professor
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office hours: TBA

Course Web Page: `http://commsci1.usc.edu/Courses/Mitra.EE464/`
Contains homework, solutions, and relevant handouts. Course announcements, homework hints and modifications will be posted on this page – please check it regularly.

Lectures: MW 12:30pm–1:50pm, OHE 100 (Studio C)

Discussion: W 5:00pm–5:50pm, OHE 100 (Studio D)

Course Objectives: To provide a fundamental understanding of concepts and techniques of random variables. The emphasis will be on developing the analysis and design tools needed to apply probability and random variables in graduate electrical engineering courses and research.

Prerequisites: Calculus, undergraduate linear algebra and basic matrix theory.

Other Requirements: Basic computer skills (*i.e.* programming and plotting).

Text:
1. Probability and Random Processes for Electrical Engineering, 2nd ed., by Alberto Leon-Garcia, Addison-Wesley Publishing Co., Reading MA, 1994; ISBN: 0-201-50037-X.

Grading: 20% Homework
35% Midterm (1.3 hours)
45% Final (2.0 hours)
Final grades will be assigned by a combination of student score distribution (curve) and the discretion of the instructor.

Exams: **Midterm** Wednesday, February 23, 12:30pm – 1:50pm
Final Friday, May 6, 2005, 11:00am –1:00pm

Office Hours: 2:00pm-3:30pm Tuesdays, Wednesdays and by appointment.
Use of email to set up appointments encouraged: ubli@usc.edu. Attending office hours in person is encouraged.

Late Policy: No late homework will be accepted. A late assignment results in a zero grade.

Make-up Material: Homework assignment dates are non-negotiable. No make-up exams will be given. In the case of a required business trip or a medical emergency, a signed letter from your manager or doctor is required. This letter must include the telephone number of your doctor or supervisor.

Grade Adjustment: If you dispute any scoring of a problem on an exam or homework set, you have **one week** from the date that the graded paper is returned to request a change in the grade. After this time, no further alterations will be considered. All requests for a change in grade must be submitted in writing to me.

Attendance: Lecture attendance is encouraged; many examples and applications not in the text will be covered in the lectures. The student is responsible for all assignments, changes of assignments, announcements, lecture notes *etc.* All such changes should be posted on the course web-site.

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 0 points on the homework or exam, to an F in the course, to recommended expulsion. See:

`http://www.usc.edu/dept/publications/SCAMPUS/governance/gov11.html`
`http://www.usc.edu/dept/ARR/grades/`

References:

1. Probability, Random Variables and Stochastic Processes, 4th ed., Athanasios Papoulis and S. Unnikrishna Pillai, McGraw-Hill, 2001, or the previous third edition of the same book by A. Papoulis as a single author.
2. Schaum's Outline of Probability, Random Variables, and Random Processes, Hwei Hsu, McGraw-Hill, 1996.
3. Probability, Random Processes, and Estimation Theory for Engineers, 2nd ed., H. Stark and J. Woods, Prentice-Hall, 1994.
4. Probability and Random Processes, Y. Viniotis, McGraw-Hill 1997.

Outline:

1. Algebra of events - set theory
2. Sample, event spaces
3. Probability as a measure in sample space
4. Conditional probability and sample spaces
5. Independence of events
6. Probability mass and densities
7. Random variables
8. Expectations and moments of random variables
9. Named densities and distributions
10. Discrete and continuous transforms
11. Frequently occurring densities
12. Poisson, Bernoulli, Markov processes
13. Gaussian, Poisson distributions
14. Gaussian random vectors
15. Functions of random variables
16. Limit theorems
17. Estimation
18. Introduction to statistics

Suggestions:

1. Remember the big picture.
2. Read the book and supplementary sources.
3. Prepare your own summaries from texts and notes.
4. Work in groups for homeworks and study (explain main concepts to each other, write up your own solutions).