UNIVERSITY OF CALIFORNIA, DAVIS
Department of Electrical and Computer Engineering

EEC161 Probabilistic Analysis of Electrical and Computer Systems Fall 2009

Course Information

Course Content: Probabilistic and statistical methods for electrical and computer systems. Discrete and continuous random variables, expectation and moments. Transformation of random variables. Joint and conditional densities. Limit theorems and statistics. Random processes, noise models, Markov chains, queuing systems.

Prerequisite: Mathematics 21A-21C, 22A, course 100.

Instructor:

	Bernard C. Levy
	3183 Kemper
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Office Hours:	Tu 2:00-4:00pm

Lectures: MW 10:00–11:50pm, 1006 Giedt

Teaching Assistant:

	Jovana Ilic
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Office Hours:	Tu 10-11am and W 1-2pm
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Textbook: C. W. Therrien and M. Tummala, *Probability for Electrical and Computer Engineers*, CRC Press, Boca Raton, FL, 2004.

Although the required text covers in detail basic probability and statistical concepts of concern for electrical and computer engineers, several additional references cover approximately the same material from different perspectives. Some of the best known are:

D. P. Bertsekas and J. N. Tsitsiklis, *Introduction to Probability*, second edition, Athena Scientific, Belmont, MA, 2008. Perhaps the most clear of all references, but does not cover random processes and noise through filters. Excellent coverage of Markov chains.

R. Y. Yates and D. J. Goodman, *Probability and Stochastic Processes – A Friendly Introduction for Electrical and Computer Engineer*, second edition, J. Wiley & Sons, New York, 2004. Similar to the textbook, but slightly more advanced.

G. R. Cooper and C. D. McGillem, *Probabilistic Methods of Signal and System Analysis*, third edition, Oxford University Press, 1999. Slightly more advanced reference, does not cover Markov chains.

Web Site Information: Most of the information for this course will be provided on the course web page at http://www.ece.ucdavis.edu/~levy/eec161.html. This course information appears on the course web page. Also on the web page will be problem set assignments, problem set solutions, and exam solutions. The web page will be updated frequently during the quarter.

Enrollment: Enrollment in this course is handled on the Web at http://sisweb.ucdavis.edu. If you decide to drop the course, you must place your drop request before Wednesday, October 21, 2009. The last date to add the course is Friday, October 9, 2009.

Problem Sets: Assigned each Wednesday on the course web page, due by 5pm the following Wednesday in the problem set box for this section located in 2131 Kemper Hall. To help in handling the problem sets, please do your work on only on side of each page, staple your pages and write your name, problem set number, and course number on the outside. The problem sets will be graded by the TA and returned in lecture

Each problem on a problem set is worth 5 points, with points allocated as follows:

Solution (4 points possible)	
Correct:	4
Minor error:	3
Major error:	2
Attempted :	1
Neatness (1 point possible)	

Late problem sets will not be accepted without prior approval from the instructor. Problem set solutions will be posted on the course web page.

Exams: There will be two mid-term exams and one final exam given under the following schedule:

Midterm # 1	October 28
Midterm # 2	November 23
Final	December 10, 3:30-5:30pm

The examinations will be closed-book, but for the first and second midterms, and for the final exam, you will have the right to use respectively one, two, and three $8\,1/2 \times 11$ pages of notes written on both sides. Calculators will be allowed, but will not be critical in the examinations. Each of the midterm examinations will cover 3 to 4 weeks of material. The final examination will cover the entire course. Futher information on exam content will be given in class prior to each examination.

Giving a make-up examination is difficult, as the examination requires a considerable amount of time to prepare, and it is difficult to make this examination equivalent to the

regularly scheduled examination. Therefore, requests for make-up examinations will only be approved in cases where strong written justification can be provided. Acceptable justification includes illness (confirmed in writing by a physician) and personal problems (confirmed by personnel at the Counseling Center). You must contact the instructor before the regularly scheduled examination to request approval of a make-up examination.

Regrading: If you think you deserve more points on a problem set or examination question, write a short note indicating what should be reconsidered, attach it to the problem set or examination, and return it to the instructor. The instructor will review the grading, reassign points if justified, and return the paper in class. If you are still not satisfied with your score, please make an appointment to meet with the instructor.

Grading: Course grades are based on a weighted sum of problem set scores, midterms, and final examination scores, with the following weights.

Problem sets	15%
Midterm 1	25%
Midterm 2	25%
Final exam	35%

The grading method lies somewhere in between an absolute scale and a curve. The instructor usually gives approximately 25% As, 25% Bs, 35% Cs, and 15% Ds and Fs for upper division undergraduate courses. However, these percentages are adjusted to take into account yearly fluctuations in the level of student performance. All homework and exam grades will be disseminated to students via MyUCDavis.

Course Outline

The lecture schedule is outlined below. Sections of the textbook that cover the topics presented during each lecture are listed in the column with heading Reading.

Date		Lect	Topic	Reading
Sept.	28	1	Events, probability	2.1-2.2
	30	2	Conditional probability, Bayes	
			law, independence	2.3-2.4
Oct.	05	3	Discrete random variables	3.1-3.2
	07	4	Continuous random variables	
			cumulative distribution, density	3.3-3.5
	12	5	Transformation of random variables	
			distributions conditioned on an event	3-6-3.7
	14	6	Expectations, moments, generating functions	4.2-4.3
	19	7	Joint probability distribution	
			conditional distribution/density	5.1-5.2
	21	8	Joint, conditional expectation/moments	5.3-5.4
	26	9	Sum of random variables	5.5
	28		*Midterm # 1*	
Nov.	02	10	Law of large numbers	
			central limit theorem	6.2-6.3
	04	11	Random processes, mean, autocorrelation	7.1-7.2
	09	12	wide-sense stationarity	
			autocovariance properties	7.3
	11		*Veterans Day*	
	16	13	Power spectral density	7.4
	18	14	Noise through linear filters	7.5-7.6
	23		*Midterm # 2*	
	25	15	Poisson process	8.1
	30	16	Markov chains	8.2
Dec.	02	17	Queuing Systems	8.4