THE UNIVERSITY OF UTAH   ECE 5510: Random Processes, Fall 2006

Lecture: Tuesday and Thursday, 9:10-10:30 A.M. at JWB 208
Prerequisite: ECE 3530, or Math 5010
Credit: 3 hours

Instructor: Neal Patwari
Office: MEB 2256
Office Hours: Monday 10am-noon, Thursday 1pm-3pm, and by appointment
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Web Page: We will be using WebCT, http://webct.utah.edu/. Please log in to the site to make sure that you have access to the class web page. Homeworks, solutions, and useful web links will be posted here.

Textbook: Roy D. Yates and David J. Goodman, *Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers*, Wiley, 2nd edition. While this is a good book, the list price is very high. Please check for used copies, including online (*e.g.* half.com). I have made the first chapter of the textbook available online in the library's electronic reserves, to provide a little bit more time for anyone who is ordering the book online. Further, a copy of the text is available at the reserve desk as a 2-hour reserve. I can also work with students who have the 1st edition to ensure their access the necessary instructional information.

Description: This course first reviews the fundamentals of probability, including conditional probability, independence, functions of and expectations of one or more random variables. Then, we address several aspects of random processes, including stationarity, power spectral density, linear time-invariant systems, and Poisson, Bernoulli, and Markov processes. This material in this course is necessary for further study and analysis in communication systems, signal processing, and controls, as well as for other areas of engineering, computer science, and statistics.

Grading Course grading will be calculated based on:
Homework: 15% (lowest homework score is dropped)
Exam 1: 20%
Exam 2: 30%
Final Exam: 35%

Lecture Notes At the start of each lecture, two students will be chosen to take detailed notes. These will be scanned and placed on the class web page.

Homework: Homework will generally be assigned each Tuesday in class (or on the web) and be due the following Tuesday at the start of class. No late homework can be accepted. However, to allow for extenuating circumstances, the lowest homework score will be dropped when calculating the final grade.

Collaboration Policy: You are encouraged to work together on homework assignments whenever possible. Discussing things is a great way to learn. After making a genuine attempt to solve the homework problems, you are encouraged to discuss the answers with other students currently enrolled in ECE 5510 to check the answers and compare solution approaches. However, after such a discussion, you must complete your answers on your own, without referring to the solutions of other students or to solutions from previous terms. You may also post and answer questions on the discussion board of the WebCT class home page.

Exams: Exams 1 and 2 are in-class tests. The final exam is a two-hour test. All exams must be taken during the scheduled times:
Exam 1: September 28, 2006
Exam 2: November 2, 2006
Final Exam: Wed., December 13, 2006, 8:00 - 10:00 am

Additional Resources: These books are at the library reserve desk for 2 hour loan:

1. John A. Gubner, *Probability and random processes for electrical and computer engineers*, Cambridge University Press, 2006.

2. Alberto Leon-Garcia, *Probability and random processes for electrical engineering*, Addison-Wesley, 1989.

3. Henry Stark and John W. Woods, *Probability and random processes with applications to signal processing*, Prentice Hall, 2002.

4. Dimitri P. Bertsekas and John N. Tsitsiklis, *Introduction to probability*, Athena Scientific, 2002.

Tips:

1. Find another student or students to help you (or to help them) when you (they) have trouble with homework problems. Do that now, from the start!

2. Read the corresponding section in the book *before* lecture.

3. Come to office hours.

4. Do additional problems, beyond the homework.

Course Schedule

No.	Class	Topics	Reading in Y&G	Homework
1	Th. Aug. 24	Intro, Set Theory	1.1, 1.2	
2	Tue. Aug. 29	Axioms of Prob.	1.3, 1.4	
3	Th. Aug. 31	Independence, Cond'l Prob., Trees	1.5, 1.6, 1.7	
4	Tue. Sept. 5	Law of Total Prob., Bayes' Thm.		HW 1 due
5	Th. Sept. 7	Discrete r.v.s: CDF, pmf	2.1-2.4,	
6	Tue. Sept. 12	Continuous r.v.s: pdf	3.1, 3.2, 3.4, 3.5	HW 2 due
7	Th. Sept. 14	Transformation of r.v.s	2.6, 3.7	
8	Tue. Sept. 19	Expectation, Moments, Cond'l Distributions	2.5, 2.7-2.9, 3.3, 3.8	HW 3 due
9	Th. Sept. 21	Jointly distributed r.v.s	4.1-4.5, 5.1-5.3	
10	Tue. Sept. 26	Review		HW 4 due
11	Th. Sept. 28	**Exam 1**		
	Tue. Oct. 3	Cov., Correlation, Conditioning Independence	4.7-4.10, 5.4	
12	Tue. Oct. 10	Gaussian Random Vectors	4.11, 5.7	HW 5 due
13	Th. Oct. 12	Transformation of R.V.s	4.6, 5.5, 5.6, 6.2	
14	Tue. Oct. 17	Random Process Basics	10.1-10.3	HW 6 due
15	Th. Oct. 19	Bernoulli R.P.s	10.4	
16	Tue. Oct. 24	Poisson R.P.s	10.5, 10.6	HW 7 due
17	Th. Oct. 26	Expectation of R.P.s, Stationarity	10.8-10.9	
18	Tue. Oct. 31	Review		HW 8 due
	Th. Nov. 2	**Exam 2**		
19	Tue. Nov. 7	Gaussian R.P.s, WSS	10.7, 10.10-10.12	
20	Th. Nov. 9	Power Spectral Density I	11.5	
21	Tue. Nov. 14	Power Spectral Density II	11.6	HW 9 due
22	Th. Nov. 16	R.P.s and LTI Systems I	11.7-11.8	
23	Tue. Nov. 21	R.P.s and LTI Systems II		HW 10 due
24	Tue. Nov. 28	R.P.s and LTI Systems III		
25	Th. Nov. 30	Markov Processes I	12.1, 12.2	HW 11 due
26	Tue. Dec. 5	Markov Processes II	12.3	
27	Th. Dec. 7	Review		HW 12 due