

University of Dayton
Dept. Electrical and Computer Engineering

ECE 503 Random Processes – Fall 2006

Instructor: Prof. Raúl Ordóñez, KL341-E, raul.ordonez@notes.udayton.edu

Office Hours: You can come almost any time I am there, but please try to make an appointment.
Official office hours are M, W, 14h00-15h30.

Text: *Probability, Random Processes and Stochastic Processes*, A. Papoulis and S. U. Pillai, McGraw Hill, 4th edition, 2002.

Course Objective: This course will provide you with a fundamental understanding of probability, random variables and an introduction to random processes, and their use in solving engineering problems. Students will be able to solve problems involving probability statements, be able to compute linear mean-square estimates of random parameters, be able to analyze linear systems with stochastic inputs, and be familiar with various noise processes and their probability distributions. The course will include a computer simulation component using Matlab to illustrate the concepts seen in class.

Outline of topics

1. Introduction and terminology. Probability, Bayes theorem, and combinatorics (Ch. 1,2 ,3).
2. Random variables, distributions, and densities (Ch. 4).
3. Functions of one and two random variables (Ch. 5, 6).
4. Expected values and moments. Moment generating and characteristic functions. Probability bounds and estimators for mean and variance (various chapters).
5. Random vectors and linear mean-square estimation (Ch. 7).
6. Random sequences and processes. Convergence. Law of large numbers. Mean and autocorrelation functions. Linear systems with random inputs and stationarity. Power spectral density (Ch. 9, 7).
7. Examples of important random sequences and processes (Ch. 10).
8. Advanced topics (time permitting)

Grading:	Homework and projects	—	45%
<i>(Tentative)</i>	Quizzes	—	10%
	Midterm exam	—	20%
	Final exam	—	25%

Miscellaneous:

- All assignments must be completed as a course requirement; penalty for late homework will be severe. You are responsible for any and all alterations in homework assignments, exam and other dates, and course announcements in general which occur in the lecture. In other words, come to class!

References (among many others):

1. *Probability and Random Processes with Applications to Signal Processing*, H. Stark and J. Woods, Prentice Hall, 3rd edition, 2002.
2. *Probability and Random Processes*, W. B. Davenport, McGraw-Hill, 1970.
3. *A First Course in Probability*, S. M. Ross. Macmillan, 1988.
4. *Introduction to Probability*, J. B. Thomas, Springer-Verlag, 1986.
5. *Foundations of the Theory of Probability*, A. Kolmogorov, Chelsea, 1950.