ECEN 4503
Random Signals and Noise
Spring 2007
Syllabus

Time: Tuesday/Thursday 12:30-1:45 PM

Place: Cordell 127

Prerequisite: Completeion of the junior block courses, in particular this course builds on the material covered in ECEN 3513- Signal Analysis and ECEN 3723- Systems I

Text: *Probability, Random Variables and Random Signal Processing* 4th edition, Peyton Z. Peebles, Jr., McGraw-Hill, 2001

References: *Probability, Random Variables, and Stochastic Processes*
A. Papoulis, McGraw-Hill, 1965
. *Probability amd Random Processes, An Introduction for Applied Scientists and Engineers*
W.B. Davenport, Mc-Graw-Hill, 1970
An Introduction to Probability and Stochastic Processes
J.L. Melsa and A.P. Sage, Prentice-Hall, 1973
Probability and Stochastic Processes for Engineers
C.W. Helstrom, Macmillian, 1984

Instructor: Professor Gary G. Yen, Engineering South 404
http://www.okstate.edu/elec-engr/faculty/yen
405-744-7743, 405-744-9198 (fax), gyen@okstate.edu
Office Hours: Tuesday/Thursday 2:00PM-5:00PM;
or by appointment only

TA: TBA, if available (weekly homework help session)

Objectives: Introduce some basic principles of probability, random variables and random signals to deal with system involving random process and noise through mathematical analysis and computer simulations. The topics include

- Probability theory
  set definition; set operations; joint and conditional probability; independent events; Bernoulli trials

- Random variable
  basic concept; discrete/continuous/mixed random variables; distribution function; density function; Gaussian random variable; Binomial/Poisson/uniform /exponential/Rayleigh random variables; conditional distribution/conditional density function

- Operations on one random variable

expectation; moment; transformation of a random variable; computer generation of random variable

- Multiple Random Variables
vector random variables; joint distribution/marginal distribution; joint density/marginal density; conditional distribution/conditional density function; statistical independence; distribution and density of a sum of random variables

- Central Limit Theorem

- Operations on multiple random variables
expected value of a function of random variables; joint Gaussian random variables; linear transformation of Gaussian random variables; computer generation of multiple random variables

- Random process
basic concept; classification of random processes; first-/second-order stationary process; wide-sense stationarity; n-order and strict-sense stationarity; time average and ergodicity; auto-correlation/cross-correlation function; covariance; Gaussian random process; Poisson random process

- Spectral analysis of random processes
power density spectrum; bandwidth; cross-power density spectrum; noise deinfition; white and colored noises

- Linear Systems with random inputs
linear system; transfer function; random signal response; spectral characteristics; noise bandwidth; modeling of noise sources; noisy network

Grading:

10 Weekly Homework Assignments	**20%**

Tentative schedule-
1/18, 1/25, 2/1, 2/8, (before the first midterm)
3/1, 3/8, 3/15, 3/27, (between the first and second midterms)
4/12, 4/19. (after the second midterm)
Spring Break (March 20 and 22)

Midterm Exam #1 (February 22, 12:30PM-2:00 PM)	**20%**
Midterm Exam #2 (April 10, 12:30PM-2:00PM)	**20%**
Computer Project (April 27, 5:00 PM)	**20%**
Final Exam (May 3, 10:00AM-11:50 AM)	**20%**

A-88% above; **B**-76%-88%; **C**-66%-75%; **D**-56%-65%; **F**-55% below
Quizzes will be given throughout the semester and counted toward the final grade as bonus points; No makeup exams will be given.

Note: All exams are open notes, but close book.

Drop and Add: The instructor will follow University, College and Departmental guidelines for drops and adds. Consult the class schedule book or Ms. Helen Daggs in Engineering South 202 for more information.

Attendance: Attendance record will be sampled randomly and will be counted toward your grade. Students will be expected to attend class. Habitual failure to do so will result in a reduced grade. An incomplete grade will only be given when a student misses a portion of the semester because of illness or accident. All (I) grades must be completed within thirty days.

Academic Integrity: The instructor will strictly follow OSU's Academic Integrity Policy. Cheating on homework, quizzes or examinations, plagiarism and other forms of academic dishonesty are serious offenses and will subject the student to serious penalties. Plagiarism. Presenting the written, published or creative work of another as your own work. Whenever you use wording, argument, data, design, etc., belonging to someone else in a paper, report, oral presentation, or other assignment, you must take this fact explicitly clear by correctly citing the appropriate references or sources. You must fully indicate the extent to which any part or parts of the project are attributed to others and provide citations for paraphrased materials.

Disability Impairment: If any member of the class feels that he/she has a disability and needs special accommodations of any nature whatsoever, the instructor will work with you and the University Office of Disabled Student Services to provide reasonable accommodations to ensure that you have a fair opportunity to perform in this class.

Class Website: You are advised to check class website at http://www.okstate.edu/elec-engr/faculty/yen/spring07.html regularly for important information, such as handouts, homework assignments, schedule changes, old exams and last minute announcements..