ECEN 5513
Stochastic Systems
Fall 2011
Syllabus

Time:	Tuesday/Thursday 10:30-11:45 AM
Place:	Cordell 127
Prerequisite:	Statistics, Probability and Random Signal and Noises
Text &: **References**	*Probability and Random Processes with Applications to Signal Processing,* 3rd edition, Stark and Woods, Prentice Hall, 2002
.	*Probability, Random Variables, and Stochastic Processes* 4th edition, Papoulis and Pillai, McGraw-Hill, 1965
	Probability, Random Variables and Random Signal Processing 4th edition, Peebles, McGraw-Hill, 2001
	An Introduction to Probability and Stochastic Processes Melsa and Sage, Prentice-Hall, 1973
	Probability and Stochastic Processes for Engineers 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 3:30PM-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 processes to deal with stochastic system involving random process and noise through mathematical analysis and computer simulations. The topics include

- Probability theory
  why probability? set definition; set operations; joint and
  conditional probability; independent events; Bayes theorem;
  Bernoulli trials; Binominal law

- 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; failure rate

- Operations on one random variable
  General formulation; expectation; moment; transformation of a
  random variable; conditional expectation; moment generating
  function; characteristic function; computer generation of
  random variable; Chebyshev and Schwarz inequality

- Multiple Random Variables or Random Vectors
  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; parameter estimation; estimation of vector means and covariance matrices

- 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 sequences
  basic concept; first-/second-order stationary process; wide-sense stationarity; n-order and strict-sense stationarity; time average and ergodicity; auto-correlation/cross-correlation function; covariance; Markov random sequences; ARMA models; Markov chains

- Random processses
  basic concept; classification of random processes; 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:	30 lectures out of 31 scheduled time slots	
	10 Weekly Homework Assignments	**30%**
	Tentative schedule-	
	9/6, 9/13, 9/20, 9/27, (before the first midterm)	
	10/13, 10/20, 10/27 (between the first and second midterms)	
	11/17, 11/24, 12/1. (after the second midterm)	
	University Holiday (November 24)	
	Midterm Exam #1 (October 6, 10:30AM-12:00 PM)	**20%**
	Midterm Exam #2 (November 10, 10:30AM-12:00PM)	**20%**
	Final Exam (December 13, 10:00AM-11:50 AM)	**30%**

A-90% above; **B**-78%-90%; **C**-68%-77%; **D**-58%-67%; **F**-57% 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 cose notes and books.

<u>Drop and Add</u>:	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.
<u>Attendance</u>:	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.
<u>Academic Integrity</u>:	The instructor will strictly follow OSU's Academic Integrity Policy as stipulated in http://academicintegrity.okstate.edu/ There is a video clip at http://ra.okstate.edu/provost/academic/integrity.html that every student (and probably every faculty member) should watch early in their academic career. This video very clearly defines the different types of academic misconduct and summarizes methods to avoid these problems.
	Cheating on homework, quizzes or examinations, plagiarism and other forms of academic dishonesty are serious offenses and will subject the student to serious penalties.
	<u>Plagiarism</u>. 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.
<u>Disability Impairment</u>:	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.
<u>Class Website</u>:	You are advised to check class website at the Online Classroom and Community page (D2L) at https://oc.okstate.edu/ regularly for important information, such as handouts, homework assignments, schedule changes, old exams and last minute announcements.