



ECEN 5513
Stochastic Systems
Fall 2007
Syllabus



- Time:** Tuesday/Thursday 10:30-11:45 AM
- Place:** Cordell 127
- Prerequisite:** Statistics, Probability and Random Signal and Noises
- Text:** *Probability and Random Processes with Applications to Signal Processing*
3rd edition, Henry Stark and John W. Woods, Prentice Hall, 2002
- References:** *Probability, Random Variables, and Stochastic Processes*
A. Papoulis and U. Pillai, 4th edition, McGraw-Hill, 1965
Probability, Random Variables and Random Signal Processing
4th edition, Peyton Z. Peebles, Jr., McGraw-Hill, 2001
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 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 processes
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 definition; 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	30%
Tentative schedule-	
8/30, 9/6, 9/13, 9/20, (before the first midterm)	
10/9, 10/16, 10/23, 10/30, (between the first and second midterms)	
11/13, 11/20. (after the second midterm)	
Fall Break and University Holiday (October 9 and November 22)	
Midterm Exam #1 (September 27, 10:30AM-12:00 PM)	20%
Midterm Exam #2 (November 6, 10:30AM-12:00PM)	20%
Final Exam (December 11, 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 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 Dagg 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 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.

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 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.