

Noise and Random Processes - ECEN 5612

Fall 2004, 3 credit hours, 2:00pm-3:15pm TR ECEE 1B28

Catalog Description: Review of probability theory; convergence and probability bounds; multivariable normal theory; sequences of random variables and stochastic processes; Bernoulli and Poisson processes; wide-sense stationary processes; correlation functions and power spectra. Linear systems with random inputs and Gauss-Markov processes; first- and second-order properties of ARMA processes; Markov chains.

Instructor: Youjian Liu, youjian.liu@colorado.edu, ECOT 337.

Office Hour: 3:15pm-4:45pm TR in classroom if available, otherwise, at ECOT third floor close to the whiteboard. Office hour will start immediately after the class and will continue as long as there are questions. To make the grades fair, questions about how to solve the homework problems will be answered after the homework is turned in. Selected homework solutions will be presented in the class. You are encouraged to ask questions if the homework problems themselves are not clear.

Homework: Homework is due Every Thursday. To be fair to those who finish the homework on time, a late homework is not accepted normally. However, all of us might have some emergency in life. So, under special circumstances discussed in advance with the instructor, a late homework will be accepted with 10% less points per day.

Grading:

- Homework 30% (10 pts per problem, the final HW score = average of Score-per-HW/Full-Score-per-HW*100. Good news! You can earn half of lost credit back by completely redo the HW CORRECTLY and resubmit it with the original HW. Depending on the level of the class, one project, which counts 10% toward the final score, may be assigned.)
- In Class Midterm 30%
- In Class Final 40%
- Final Score= Your Score/Highest Score in the class*100
- Final Grade is calculated from the credit of letter grade, i.e.,
100 >= A >= 92.5 > A- >= 82.5 > B+ >= 75.0 > B >= 67.5 > B- >= 57.5 > C+ >= 50.0 > C >= 42.5 > C- >= 32.5 > D+ >= 25.0 > D >= 17.5 > D- >= 10.0 > F >= 0

Textbook: Probability and Random Processes with Applications to Signal Processing (3rd Edition) by John W. Woods, Henry Stark, Prentice Hall, July 24, 2001, ISBN: 0130200719.

References:

For more examples and math:

- (1) Probability Theory and its Applications, by FELLER, W., second ed., vol. I(3rd ed.) & II(2nd ed.) John Wiley & Sons, 1968 & 1971.

For more math (texts used in math dept.):

- (2) A Course in Probability Theory Revised, by Kai Lai Chung, Academic Press; 2nd edition (January 15, 2000), ISBN: 0121741516.
- (3) Probability: Theory and Examples, by Richard A. Durrett, Duxbury Press; 2nd edition (August 30, 1995), ISBN: 0534243185.

For random processes:

- (4) A First Course in Stochastic Processes, by Karlin, S. and Taylor, H. M., Second edition. Academic Press, New York, 1975.

For applications:

- (5) The Probabilistic Method, by N. Alon, J. Spencer, John Wiley, 2nd ed., 2000.

Goals: Establish the theoretical foundations of probability and apply it to problems in signal processing and communications.

Prerequisites by Topic:

Linear Systems (required).

Introduction to Probability (required).

Topics: Probability.

Multivariate normal theory.

Bernoulli and Poisson random processes.

Correlation and power spectra.

ARMA time series.

Markov chains.

Computer Usage: Matlab

Administration Notes:

(1) If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. (303-492-8671, Willard 322, www.Colorado.EDU/disabilityservices)

(2) Students should inform the instructor well in advance about religious obligations that conflicts with scheduled exams, assignments or class attendance so that special accommodation could be discussed.

(3) The development of the Internet has provided students with historically unparalleled opportunities for conducting research swiftly and comprehensively. The availability of these materials does not, however, release the student from appropriately citing sources where appropriate; or applying standard rules associated with avoiding plagiarism. Specifically, the instructor will be expecting to review papers written by students drawing ideas and information from various sources (cited appropriately), presented generally in the student's words after careful analysis, synthesis, and evaluation. An assembly of huge blocks of other individuals' existing material, even when cited, does not constitute an appropriate representation of this expectation. Uncited, plagiarized material shall be treated as academically dishonest, and the paper will be assigned an 'F' as a result. If the student is confused as to what constitutes plagiarism, he/she should review the CU Honor Code on this topic, or see the instructor. Papers submitted by any student, written in part or in whole by someone other than that student, shall be considered to constitute fraud under the University Honor Code, and result in the assignment of an 'F' for the entire course.