Course Syllabus
EE562a

Term: Fall 2010
Course title: Random Processes in Engineering
Lecture: Monday & Wednesday, 11:00 am-12:20 pm, OHE 100B
Discussion Session: Friday, 5:00-5:50 pm, OHE 100C
Instructor: Robert Scholtz
   Office Hours: Monday & Wednesday, 2:00-3:30 pm, EEB 500B
   Contact: (213) 740-7327, scholtz@usc.edu
Teaching Assistant: Kartik Audhkhasi
   Office Hours: Tuesday, 3-5 pm, PHE 330, (213) 740-4372
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Grader: Yi Wang
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Firm prerequisites:
1. Linear Algebra, matrix theory, linear spaces, bases, eigenvectors, eigenvalues, etc. (EE 441 or pass placement exam).
2. Probability theory and random variables, moments, transformations of random variables, characteristic functions and moment generating functions, etc. (EE 464 or pass placement exam).
3. Fourier, Laplace, and z transforms, complex variables, contour integrals, and residue theory (EE 401 or equivalent).

Reading Materials:
1. Supplemental course notes available on DEN website, cover primarily first 95% of course.
Homework: Approximately 8-9 problem sets

Midterm Exam: Wednesday, October 13, 11 am (1 hour, 20 minutes)

Final exam: Wednesday, December 8, 11 am (2 hours)

Grading Policy:
- Homework 10%
- Midterm 35%
- Final 55%

Topics:
This is a first course in random processes for engineers, and is a prerequisite for many courses in communications, controls and signal processing.

1. Definition of random processes: random variables, random vectors, random sequences, random waveforms, etc.
3. Covariance matrix factorization, eigenvalues, eigenvectors, causal factoring and whitening concepts.
4. Simple hypothesis tests.
5. Linear minimum mean square error estimation, orthogonality principle.

(Midterm on the above material)

7. Linear operations, convergence concepts: convolution, integration, differentiation.
8. Time averages, stationarity, ergodicity.
10. Energy spectra, power spectra, white noise approximations.
11. Linear transformations of wide-sense stationary random processes, spectral factorization, and applications.
13. Time permitting: Poisson distributed events in time, Campbell’s theorem; narrowband representations.

(Final covers the whole course, but with an emphasis on topics 7-12.)