Overview: This course is an introduction to probability, statistics and random processes for engineers. This course will focus on the fundamental theory, but also illustrate these ideas with applications in communication systems, computer systems, algorithms (e.g. web search), and logistics.

Pre-requisites: EE 313 with a grade of C or better.

Textbook: Introduction to Probability, Dimitri Bertsekas and John Tsitsiklis. Athena Scientific, 2nd edition, 2008.

Class Hours: Class will be held on **Tuesday and Thursday, 11:00 AM - 12:30 PM** in **ACA 1.104**. Office hours will be held from **9:30 AM - 11:00 AM** in ENS 437 on Tuesday and Thursday.

Teaching Assistant: The course TA is Rajat Sen, Details on the TA contact information, meeting times and location are available on Blackboard.

Course Policy: Attendance is expected. You are responsible for material covered in the reading assignments (even if not covered in class) as well as material covered in class that is not in the book. Homework will be assigned roughly every week and will be due at the begining of class. **Late homeworks will not be accepted.** Plus/minus letter grades can be assigned, and determined on a case-by-case basis.

Homeworks and related material will be posted on Blackboard, `http://courses.utexas.edu`

You may discuss homework problems with other students, but you are not allowed to copy from others. University disciplinary procedures will be invoked if any form of cheating is detected. Course and instructor evaluations will occur in the last week of class.

"The University of Texas at Austin provides, upon request, appropriate academic adjustments for qualified students with disabilities." For more information, contact the Office of the Dean of Students at 471-6259, 471-4241 TDD or the College of Engineering Director of Students with Disabilities at 471-4321.

Grading:

(i) Class Participation: 5%

(ii) Homework: 15%

(iii) Midterm Exam 1: 20%, October 3, 2013

(iv) Midterm Exam 2: 20%, November 5, 2013

(v) Final Exam: 40%, (*Tentative*: Wednesday, December 11, 9:00-12:00 noon; see http://registrar.utexas.edu for confirmed data/time)

Syllabus

1. **Introduction:** sets, models of probability, conditional probability and the Bayes rule, independence and counting (permutations and combinations)

2. **Discrete Random Variables:** probability mass function, functions of Random Variables (r.v.s), expectation, variance, joint distribution, conditioning

3. **Continuous Random Variables:** cdf, pdf, normal r.v., conditioning, functions of r.v.s, generation of random numbers, multiple r.v.s and the joint distribution

4. **Further Topics:** transforms and the MGF, sums of r.v.s, conditional expectation, tower rule, covariance and correlation, MMSE, LMSE, bivariate normal distribution

5. **Random Processes:** introduction, stationarity, ergodicity, Discrete Time Markov Chains, autocorrelation, power spectral density, random processes through linear systems, the Poisson Process

6. **Limit Theorems:** the Chebyshev and Markov inequalities, the weak law of large numbers, the central limit theorem

7. **Topics in Statistics:** confidence intervals, point estimators – unbiased and consistent estimators, hypothesis testing, the MAP (Maximum A-Posteriori) and ML (Maximum Likelihood) criterion

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References

(i) Probability and Stochastic Processes, Roy D. Yates and David J. Goodman, John Wiley and Sons, 1999.

(ii) Introduction to Probability, and Statistics for Engineers and Scientists, Sheldon Ross, John Wiley, 1987.