ESE 503: Stochastic Systems

Fall 2017

Instructor: Dr. Petar M. Djurić
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Office hours:
TU 10:00 AM - 12:00 PM,
W 3:00 PM - 5:00 PM
or by appointment

Class Meetings: Social Behavior, S 228
W 10:00 AM - 1:00 PM

Grading: Midterm 40%
Final 60%

Textbook: A. Papoulis and S. U. Pillai, *Probability, Random Variables, and Stochastic Processes*, McGraw Hill, 2002

Topics:

- Introduction to the concept of probability. Probability space. Axioms of probability. Conditional probability. Stochastic independence.
- Combined experiments. Repeated trials. Bernoulli's theorem.
- Random variables. Distribution and density functions. Random vectors. Specific random variables.
- Functions of random variables. Moments.
- Bivariate distributions. Functions of two random variables. Order statistics. Joint moments. Joint characteristic functions. Conditional expectations.
- Random vectors. Conditional densities. Multivariate normal distribution.
- Mean-square estimation. Stochastic convergence. Limit theorems.
- Monte Carlo methods.
- Random processes -- general concepts. Stationary processes.
- Systems with stochastic inputs.
- Discrete-time processes.
- Random walks. Wiener processes. Brownian motion. Poisson processes. Gaussian processes.

Goals: The goal of the course is to teach students the basics of probability theory and stochastic processes. More specifically, it is to introduce the students to the concept of probability spaces, random variables, random vectors and random processes. The goal is then to apply these concepts to system theory. Exposing the students to applications of probability theory is another important goal.

Objectives: Upon completion of this course, students will be able to solve a range of problems that involve random events, variables and vectors as well as systems with stochastic inputs. The students will also be able to solve problems with practical context.

Americans with Disabilities Act: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC(Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.http://studentaffairs.stonybrook.edu/dss/index.shtml.

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