Polytechnic University of Puerto Rico
Department of Electrical Engineering
Master in Electrical Engineering

Course Syllabus

Course Title : Stochastic Processes

Course Code : EE 6020

Credits : Three (3) credits

Duration : One academic quarter.

Schedule : Forty-five credit hours per course.

Prerequisites : Undergraduate Probability and Statistics or Undergraduate Random Processes.

Course Description

The course starts with a brief review of Probability. Other topics include: Random Processes, Spectral Characteristics of Random Processes, Linear Systems with Random Inputs, Modeling Noisy Networks, Introduction to Signal Detection and Filtering including the Matched Filter, the Wiener Filter and the Kalman Filter.

Justification

Courses in Signal Analysis and Communications require students to have an adequate background in Stochastic Processes, Signal Detection and Filtering. The material selected for this class will provide a foundation for future courses in Communication Theory, Signal Processing and Controls.

Objectives

To provide adequate foundation in the areas of Stochastic Processes and Signal Detection for future courses in Communication Theory, Signal Processing and Controls.

Textbook

Random Signals. Detection, Estimation and Data Analysis. (1988)
By K. S. Shanmugan and A. M. Breipol
1st Edition
John Wiley & Sons
ISBN: 0471-81555-1

Course Outline

Topics Covered

1. Review of Probability and Random Variables.
2. Random Processes.
3. Spectral Characteristics of Random Processes.
4. Response of Linear Systems to Random Inputs. Modeling of Noisy Networks.
5. Special Classes of Random Processes. Autoregressive Processes, Markov Processes, Gaussian Processes, etc.
6. Introduction to Signal Detection. Binary Detection. Matched Filters, Linear Mean Square Estimation. Wiener and Kalman Filters.

Evaluation Criteria

Final course grade will be determined, unless otherwise accorded in class, based on the following scale:

100-90	A
89-80	B
79-70	C
69-60	D
59- 0	F

Homework is suggested to be 0% to 10% of the final grade. Three exams and a final exam are given to the students.

Course History

April, 2002; prepared by Pedro Torres Ph.D., P.E.
April 2002, revised by Marvi Teixeira, Ph. D., P.E.

Bibliography

Communication System Engineering. (2002)
By J. G. Proakis and M. Salehi.
2nd Edition
Prentice Hall
ISBN: 0-13-061793-8

Probability, Random Variables and Stochastic Processes. (2001)
By A. Papoulis
4th Edition
Prentice Hall.
ISBN: 0072817259

Probability, Random Variables and Random Signal Principles. (2000)
By P. Z. Peebles, JR.
4th Edition
McGraw-Hill
ISBN: 0073660078

Statistical Digital Signal Processing and Modeling (1996)
By M. H. Hayes.
1st Edition
John Wiley & Sons
ISBN: 0-417-59431-8

Probability and Random Processes for Electrical Engineering (1993)
By A. Leon-Garcia
2nd Edition
Addison Wesley
ISBN: 0-201-50037-X

Introduction to Random Processes. With Applications to Signal & Systems (1990)
By W. A. Gardner.
2nd Edition
McGraw-Hill
ISBN:0-07-022855-8

Modern Spectral Estimation. Theory and Applications (1988)
By S. M. Kay.
1st Edition
Prentice Hall
ISBN: 0-13-598582-X