

University of Puerto Rico
 Mayagüez Campus
 College of Engineering
 Department of Electrical and Computer Engineering
 Graduate Program in Electrical Engineering

Course Syllabus

1. General Information:

Alpha-numeric codification: INEL 6078
 Course Title: ESTIMATION, DETECTION, AND STOCHASTIC PROCESSES
 Number of credits: 3
 Contact Period: 3 hours of lecture per week

2. Course Description:

English: Fundamentals of detection, estimation, and random process theory relevant for signal processing, communications, and control. Random processes and sequences. Linear systems driven by random processes. Bayesian and nonrandom parameter estimation. Signal detection and estimation from waveform observations. Wiener and Kalman filters.

Spanish: Fundamentos de las teorías de estimación, detección, y procesos estocásticos relevantes a procesamiento de señales, comunicaciones, y control. Procesos y secuencias aleatorias. Sistemas lineales excitados por procesos estocásticos. Estimación de parámetros Bayesiana y no aleatoria. Estimación y detección de señales a partir de observaciones de la forma de onda. Filtros de Wiener y Kalman.

3. Pre/Co-requisites and other requirements:

4. Course Objectives:

The student should be able to apply probabilistic methods to model signals and systems. To apply these models in the design of algorithms for estimation and detection. To determine the effect of linear systems in the statistical properties of signals through them. To interpret technical literature in electrical engineering where these models are applied.

5. Instructional Strategies:

- conference discussion computation laboratory
- seminar with formal presentation seminar without formal presentation workshop
- art workshop practice trip thesis special problems tutoring
- research other, please specify:

6. Minimum or Required Resources Available:

Standard lecturing facilities and MATLAB software.

7. Course time frame and thematic outline

Outline	Contact Hours
1. Probability Review, Random Vectors	4
2. Random Processes and Sequences	10
3. Random Processes and Linear Systems	4
4. Hypothesis Testing and Signal Detection	6
5. Parameter Estimation	7
6. Estimation from Waveform Observations	4
7. Kalman and Wiener Filtering	7

8. Tests	3
Total hours: (equivalent to contact period)	45

8. Grading System

Quantifiable (letters) Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	3	60
<input checked="" type="checkbox"/> Final Exam	1	30
<input type="checkbox"/> Short Quizzes		
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographs		
<input type="checkbox"/> Portfolio		
<input type="checkbox"/> Projects		
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Homework	3-4	10
TOTAL:		100%

10. Bibliography:

1. V. Krishnan, Probability and Random Processes, John Wiley, 2006.
2. J.A. Gubner, Probability and Random Processes for Electrical and Computer Engineers, Cambridge University Press, 2006.
3. R.D. Yates and D.J. Goodman, Probability and Stochastic Processes: An Friendly Introduction for Electrical and Computer Engineers, John Wiley and Sons, 2005.
4. M. Barkat, Signal Detection and Estimation, Second Edition, Artech House Inc, 2005.
5. L.C. Ludeman, Random Processes: Filtering, Estimation, and Detection, John Wiley & Sons, 2003.
6. H. Stark and J.W. Woods, Probability, Random Processes, and Estimation Theory for Engineers, 3rd Edition, Prentice Hall, 2002.
7. Papoulis and S.U. Pillai, Probability, Random Variables, and Stochastic Processes, Fourth Edition, McGraw-Hill, 2002.

11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

Person who prepared this description and date of preparation:

Miguel Vélez-Reyes, August 2007