

# RANDOM PROCESSES AND ESTIMATION THEORY

Fall 2009

**Instructor:** Assoc. Prof. Çiğdem Eroğlu Erdem

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**Office:** D 403

**Class Hours and Location:** Thursday 12:30-15:30

**Prerequisites:** Undergraduate level courses on probability and linear algebra.

**Textbook:** Henry Stark & John W. Woods, *Probability and Random Processes with Applications to Signal Processing* (third edition), Prentice Hall, 2002, ISBN 013020071-9 (required)

**Course Web Site:** <http://staff.eng.bahcesehir.edu.tr/~cigdemeroglu/teaching.html>

## Supplementary Books:

Athanasios Papoulis & S. Unnikrishna Pillai, *Probability, Random Variables and Stochastic Processes* (4<sup>th</sup> edition), McGraw Hill, 2002, ISBN 0071226613

Leon-Garcia, *Probability, Statistics, and Random Processes for Electrical Engineering*, Pearson Education, 2009 ISBN 0-13-715560-3

Henry Stark & John W. Woods, *Probability, Random Processes, and Estimation Theory for Engineers* (2<sup>nd</sup> edition), Prentice Hall, 1994, ISBN 0137287917

**Catalog Description:** Introduce the fundamental principles and techniques for statistical analysis, detection and estimation of signals.

<b>Grading:</b>	Midterm	% 30
	Quizzes & Homeworks	% 30
	Final Exam	% 40

## Course Outline:

1. Introduction to probability
2. Random variables
3. Functions of random variables
4. Expectation and introduction to estimation
5. Random vectors and parameter estimation
6. Random Sequences
7. Random Processes
8. Applications to Statistical Signal Processing
  - a. Kalman filtering
  - b. Wiener filter
  - c. Expectation-Maximization algorithm
  - d. Spectral estimation