Detection & Estimation Theory

Course No: 16:332:549   Spring 2012

DESCRIPTION : Classical decision theory, hypothesis testing, detection of known signals and signals with unknown parameters in (white and colored) noise, receiver performance and error probability, applications to wireless communications. Statistical estimation theory, performance measures, bounds and efficiency criteria. Waveform estimation, estimation for nonlinear signal models, non-parametric estimation, applications in joint detection/estimation for wireless communications.

INSTRUCTOR: Narayan B. Mandayam (narayan@winlab, WINLAB 932-6857 x-642)

COURSE TIME/PLACE: Mon-Wed 3:20-4:40 PM @ SEC 212

TEXT : Srinath, M. D. and Rajasekaran, P. K. and Viswanathan, R., *Introduction to Statistical Signal Processing with Applications*, Prentice Hall, NJ, 1996.

REFERENCES:

Helstrom, C. W., *Elements of Signal Detection and Estimation*, Prentice Hall, NJ, 1995
Van Trees, H. L., *Detection, Estimation and Modulation Theory: Part I*, John Wiley and Sons, NY, 1968

Topical Course Outline:

- Short review of basic concepts from systems theory and stochastic processes
- Classical statistical decision theory
- Hypotheses testing
- Detection of Signals in Noise
- Receiver performance
- Applications to wireless communications
- Statistical estimation theory
- Performance metrics and bounds
- Estimation of unknown signals in noise, waveform estimation.
- Non-parametric estimation
- Joint detection/estimation with applications in communications

Course Requirements: Weekly assignments, 2 Midterms(70%) and Final Project(30%)