ENEE 621 ESTIMATION AND DETECTION THEORY  
Spring 2009

Time/Venue  
MW 5 – 6:15 pm  
CSI 3118

Instructor  
Prakash Narayan  
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Office hours  
MW 3:30 – 4:45 pm  
Also by appointment

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Office hours  
TuTh 2:00 – 3:15 pm  
Also by appointment

Text:  
The required text is:  


Additional reading material can be found in the appended reference list.

Course grade  
The final grade for the course will be determined by a student’s performance in three in-class examinations:  
- two midterm examination (30% each exam); and  
- a final examination (40%).

The schedule of examinations is as follows:  
- Midterm Examination I: (Tentative) Second week of March 2009;  
- Midterm Examination II: (Tentative) Third week of April 18, 2009;  
- Final Examination: Monday, May 18, 2009, 4 – 6 pm.
Homework

Homework problem sets will be distributed at regular intervals; solutions will be provided shortly thereafter.

COURSE OUTLINE

I. Estimation Theory

I.1. Bayesian parameter estimation: mean-squared error and maximum a posteriori probability criteria.


I.6. Wiener filtering: estimation for stationary processes (time permitting)

I.7. Minimum Description Length (MDL) principle (time permitting).

II. Detection Theory


II.1.2 Multiple hypothesis testing.

II.1.3 Composite hypothesis testing: generalized likelihood ratio, uniformly most powerful test.

II.1.4 Sequential detection: Wald’s test.

II.2 Detection of signals in noise: discrete time, continuous time.

II.2.1 Detection of known signals in white noise: discrete-time approximations: Brownian motion approach, bandlimited noise approach; correlation receiver, matched filter receiver.

II.2.2 Detection of known signals in colored noise: Karhünen-Loeve expansion, whitening filter approach, singular detection.

II.2.3 Detection of known signals in noise: signal-to-noise ratio criterion.

II.2.4 Detection of signals with unknown parameters: deterministic and random parameters.
REFERENCE LIST


