

TEL 502E – Detection and Estimation Theory

Spring 2016

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Class Meets : Tuesday, 9.30 – 12.30, EEB 5205

Textbook : 'Fundamentals of Statistical Signal Processing' (Vols. I,II), S. M. Kay, Prentice Hall.

Supplementary : 'An Introduction to Signal Detection and Estimation', H. V. Poor, Springer.
'Introduction to Probability', D. P. Bersekas, J. N. Tsitsiklis, Athena Scientific.
'Statistical Inference', G. Casella and R. L. Berger, Cengage Learning.
'Optimal Filtering', B. D. O. Anderson and J. B. Moore, Dover.

Webpage : There's a 'ninova' page, please log in and check.

Grading : Homeworks (10%), Midterm exam (40%), Final Exam (50%).

Tentative Course Outline

- (1) Review of probability theory
- (2) The estimation problem, minimum variance unbiased estimators
- (3) The Cramér-Rao bound, sufficient statistics, Rao-Blackwell Theorem
- (4) Best linear unbiased estimators maximum likelihood estimation
- (5) Bayesian estimation, minimum mean square estimators, maximum a posteriori estimators
- (6) The innovations process, Wiener filtering, recursive least squares, the Kalman filter
- (7) Interval Estimation
- (8) Simple Hypothesis Testing, the Neyman Pearson Lemma
- (9) Bayesian tests, multiple hypothesis testing
- (10) The matched filter, detection of stochastic signals