

Course Name:	ECE 59500 Statistical Signal Processing
Credit and contact hours:	(3 cr.) Class 3
Course coordinator's name	Paul Salama
Textbook	Introduction to Statistical Signal Processing with Applications, M. Srinath, P.K. Rajasekaran, R. Viswanathan, 1 st edition, <i>Prentice Hall</i> , 1995, ISBN 978-0131252950
Course Information	<p>2014-16 IUPUI Campus Bulletin description: This course presents the basics of estimation and detection theory that are commonly applied in communications and signal processing systems. Applications in communications and signal processing will be considered throughout.</p> <p>Prerequisites/ CoRequisite Graduate standing</p> <p>Indicate whether a required, elective, or selected elective course in the program</p>
Goals for the course	<p>Upon successful completion of the course, students should be able to</p> <ol style="list-style-type: none"> 1. Apply Maximum Likelihood (ML) estimation 2. Apply Bayesian Estimation 3. Apply hypothesis Testing to perform signal detection in noise 4. Use Linear Estimation techniques including the appropriate Wiener and Kalman Filters for communication and Signal processing problems 5. Determine the appropriate Wiener and Kalman Filters
List of topics to be covered	<ol style="list-style-type: none"> 1. Maximum Likelihood (ML) Estimation: The Maximum Likelihood Principle and Maximum Likelihood Estimation, Invariance Principle, The Fisher Information Matrix and the Cramer-Rao Lower Bound 2. Bayesian Estimation: Priors, likelihood functions and posterior distributions, Bayes Risk and Bayesian estimators, Non-informative priors, maximum entropy priors and exponential families 3. Linear Estimation: Least Squares Estimation, Ordinary least squares, Covariance factorization and generalized least squares 4. Discrete-Time Kalman Filtering: System and measurements models 5. Continuous-Time MMSE Filtering 6. Applications in Communications: pre-transmission equalizers, random channels, matched filters, multiplicative noise, causal Filters
Syllabi Approved by	Paul Salama
Date of Approval	August 1, 2015