

University of Colorado at Denver

Departments of Computer Science (Engineering) and Electrical Engineering

EE 5657

Detection and Extraction of Signals from Noise (3.0 Credit Hours)

Fall Semester 2009 (MW 7:00p.m. to 8:15p.m.)

Instructor: Dr. Titsa Papantoni

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Office Hours: Mondays, 5:30p.m. to 6:30p.m.
Wednesdays, 1:30 p.m. to 3:30p.m.
Or by appointment

Catalog Data: Introduction to Statistical Inference Theory: Hypothesis Testing/Detection Theory. Parameter Estimation. Filtering, Prediction and Interpolation.

Qualitative Robustness and Robust Schemes in Statistical Inference. Application to Signal Processing, Communications and Networks, Information Theory and Decoding

Textbook: D. Kazakos and P. Papantoni Kazakos, *Detection and Estimation*, Computer Science Press, 1990. Can be found in Amazon.com used.

Goals: To expose the students to advanced stochastic Concepts needed for the successful design of sophisticated signal processing, communications and computer-communication network systems.

Topics: Detection Theory: Bayesian and Neyman-Pearson
Sequential Detection: Wald Tests and Repeated Wald Tests
Nonparametric Detection
Robust Detection Schemes.
Parameter Estimation: Baesian and Maximum Likelihood Schemes
Interpolation, Prediction and Filtering: Linear Mean Squared Estimation,
Wiener Filtering, Kalman-Bucy Filtering
Qualitative Robustness: Resistance to Outliers, Outlier Resistant Filtering
Applications to design of Signal Processing, Communications and
Computer-Communications Networks Systems and to their performance
evaluation

Course Logistics: Homework will be given weekly. Homework solutions will be provided one week after. There will be two midterm and one final exams. There may be a no-risk makeup exam, after the first midterm (highest among the two exams grade maintained). The grade distribution is as follows: Homework, 25%. Midterm 1, 25%. Midterm 2, 25%. Final , 25%.