Information Modeling and Extraction (InfoModEx — ENGR352)

An Online Video Course on Information Modeling and Extraction in Uncertain Systems

Who should take it: Engineers/scientists working on automated decision systems for advanced surveillance, targeting and multisensor information fusion.

Focus of the course: Advanced applied mathematics for modeling of engineering systems with uncertainties and algorithms for information extraction from dynamic stochastic systems, which is the prerequisite for information fusion.

The course consists of 40 videotaped lectures by Professor Yaakov Bar-Shalom, Distinguished IEEE AESS Lecturer, and is based on the text

Y. Bar-Shalom, X. R. Li and T. Kirubarajan, **Estimation with Applications to Tracking and Navigation: Theory, Algorithms and Software**, Wiley Interscience, 2001.

Course outline:

Basics of vector and matrix analysis.

Linear dynamic systems: state space representation, controllability and observability.

Tools from probability, stochastic processes and statistics for analysis and design of engineering systems.

Parameter estimation and limits of information in uncertain systems.

Representation of uncertainty in continuous and discrete time dynamic systems.

Dynamic state estimation: information extraction and information fusion. Performance prediction.

Simulation of uncertain systems and performance evaluation. Interpretation of stochastic data.

Estimation for hybrid engineering systems (with continuous and discrete uncertainties).

Real world examples: Vehicle collision avoidance system. Passive localization of a moving object. Tracking in air traffic control systems. Navigation with the Global Positioning System (GPS).

Homework and Project Assignments

Selfwork Problems and Computer Project assignments are available (with solutions). They are numbered according to the lecture number following which they should be carried out. Some of the problems have been custom developed for this online course, others are from the course text.

Questions regarding the course can be sent to ybs@ee.uconn.edu with subject matter "352".