

## Decision Systems Engineering Spring '14 Seminar Series

### “On the Use of Phi-Divergences for Data-Driven Stochastic Optimization with Application to Water Allocation”

#### FEATURING



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**Friday, January 24th - 12:00 PM – 1:15 PM**  
**BYENG 210**

#### Abstract:

Phi-divergences (Kullback-Leibler divergence, chi-squared distance, etc.) provide a natural way to create a set of distributions that are centered around a nominal distribution. In a data-driven setting, the nominal distribution is often determined by collected observations, expert opinions, results of simulations, etc. In this talk, we investigate the properties of phi-divergences for their use in data-driven stochastic optimization. In particular, we focus on two-stage ambiguous stochastic programs, a class of distributionally robust optimization problems, and present a condition for assessing the value of collecting additional data. We demonstrate convergence of the phi-divergence-based ambiguous program to the associated non-ambiguous stochastic program as more data is collected. A classification of phi-divergences elucidates their use for models with different properties and different sources of data. A decomposition-based solution algorithm to solve the resulting model is given. The results are demonstrated on a multi-period water allocation problem with various sources of uncertain data including (1) future population growth, (2) availability of water, and (3) climate variability and how it relates to water usage.

#### Bio:

Güzin Bayraksan is an associate professor in the Integrated Systems Engineering department at the Ohio State University. Prior to joining OSU, she was a member of the Systems and Industrial Engineering Department and the Graduate Interdisciplinary Program in Applied Mathematics at the University of Arizona. She received her Ph.D. in Operations Research and Industrial Engineering from the University of Texas at Austin and B.S. in Industrial Engineering from Bosphorus (Bogazici) University in Istanbul, Turkey. Her research interests are in stochastic optimization, particularly Monte Carlo sampling-based and data-driven methods for stochastic programming with applications in water resources management. She is the recipient of 2012 NSF CAREER award, 2012 Five Star Faculty Award (UA), and the 2008 INFORMS best case study award. She currently serves as an elected member and treasurer of the Committee on Stochastic Programming (COSP), president-elect of the Forum for Women in Operations Research and Management Science (WORMS), and on the editorial board of IIE Transactions.