

# Industrial and Systems Engineering Seminar

## *Models and Methods for Moment Robust Decision Making*

Wednesday, March 26

3:15 PM – Refreshments before the Seminar

**3:30 PM – Graduate Seminar**

**Mechanical Engineering Room 4125 A & B**



### **Professor Sanjay Mehrotra**

Professor

McCormick School of Engineering -  
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Stochastic optimization is a framework for modeling problems that involve uncertainty. The framework is called stochastic programming if the probability distribution of the parameter is known. It is called robust optimization if parameters are known within a certain bound only. In many situations, we don't know the parameter distribution precisely, but have partial statistical information (mean, variance) on the parameters beyond the bounds. The stochastic optimization framework is called distributionally (or moment) robust optimization if decision models are framed to incorporate partial statistical information.

In this talk we will present our recent research on the topic of distributional robust optimization. We will then establish a connection between stochastic programming, classical robust optimization, and distributional robust optimization. Next we will first present a semi-infinite linear programming based approach for generating moment matching scenarios. We will present results on the use of these scenarios in the context of stochastic optimization. We will next present a cutting surface algorithm for solving semi-infinite convex programs, and apply this algorithm to the geometrical problem of finding the tightest enclosing ellipsoid for enclosing a parametric curve, and a portfolio investment problem modeled as a distributionally robust optimization problem. We will also discuss future research directions that are needed to further develop the proposed methodologies.

**Bio:** Sanjay Mehrotra is the current chair of INFORMS Optimization Society. He is the director of the Center for Engineering and Health at Northwestern University's Institute for Public Health and Medicine. He has been a vice-president of (Chapter/Fora) at the Institute for Operations Research and Management Sciences. Mehrotra is widely known for his methodology research in optimization that has spanned topics in linear, convex, mixed integer, stochastic, multi-objective, distributionally robust, and risk adjusted optimization. His applied research in healthcare research has included topics in bioinformatics, predictive modeling, budgeting, hospital operations, and policy modeling using modern operations research tools. He is the current editor for Healthcare Systems Engineering department of the Institute for Industrial Engineering journal IIE-Transactions. He also held the role of department editor for the Optimization department for the same journal.