

BERNARD SARCHET GRADUATE SEMINAR SERIES

Discrete Optimization via Simulation Using Gaussian Markov Random Fields



Dr. Barry Nelson
Northwestern University

Dr. Barry Nelson is the Walter P. Murphy Professor and co-director of the masters of engineering management program in industrial engineering and management sciences, McCormick School of Engineering and Applied Science, Northwestern University.

Abstract: The problem is maximizing or minimizing the expected value of a stochastic performance measure that can be observed by running a dynamic, discrete-event simulation when the feasible solutions are defined by integer decision variables. Inventory sizing, call center staffing and manufacturing system design are common applications. Standard approaches are ranking and selection, which takes no advantage of the relationship among solutions, and adaptive random search, which exploits it but in a heuristic way (“good solutions tend to be clustered”). Instead, we construct an optimization procedure built on modeling the relationship as a discrete Gaussian Markov random field (GMRF). This enables computation of the expected improvement (EI) that could be obtained by running the simulation for any feasible solution, whether actually simulated or not. The computation of EI can be numerically challenging, in general, but the GMRF representation greatly reduces the burden. No background in simulation optimization or GMRFs is assumed, and intuition is emphasized over theory.

**Tuesday,
Feb. 23, 2016**

2-3:15 p.m.

**213 Butler-
Carlton Hall**



Presented by:

**Engineering
Management and
Systems Engineering
573-341-4572**

MISSOURI
S&T