

# COLLOQUIUM

DEPARTMENT OF MATHEMATICS AND STATISTICS  
OAKLAND UNIVERSITY  
ROCHESTER, MICHIGAN 48309

**Debra Elkins**  
General Motors R&D Center

## **The Need for Mathematics and Statistics in Enterprise Risk Management**

**Abstract:** Enterprise risk management is an emerging need for many global corporations, largely due to Basel II Accords and Sarbanes-Oxley Act, as well as the numerous highly visible risk events appearing recently in the media. Uncertain events, such as weather-related events, labor strikes, terrorist attacks, new governmental regulations, product tampering, and utility outages, affect the performance of an enterprise. While these risks are not new, the evolving interdependent global enterprise network structure can either exacerbate or mitigate the effects of those events. Two key questions that executives are asking are (1) How likely are these risk events to occur and (2) How severe are the impacts if a risk event occurs? To answer these questions, researchers must have a fundamental understanding of probability and statistics, and more generally statistical decision-making under uncertainty. To begin addressing enterprise risk management for manufacturing and supply chain operations (e.g., an automotive industry application), we identify an industry portfolio of risks and propose a framework to assess business interruption risk. We demonstrate how a *Generalized Semi-Markov Process (GSMP)* simulation technique can be used to connect probabilistic risk information to enterprise network models. Finally, we discuss a research agenda and industry trends from a practitioner perspective. We perceive that rapid progress can be made by combining known results from stochastic processes and applied probability, supply chain network modeling, decision and risk analysis, systems of systems modeling, discrete event simulation, etc., to support businesses adopting risk-informed enterprise management.

**372 Science and Engineering Building**  
**Tuesday, October 12, 2004**  
**3:00–4:00 p.m.**

(Refreshments at 2:30 p.m. in Room 368, Science and Engineering Building)

Debra Elkins is the Research Program Manager and technical lead for Enterprise Risk Management research at General Motors R&D Center in Warren, Michigan. Her research interests include enterprise level modeling of manufacturing and supply chain operations, risk modeling and analysis, decision-making under uncertainty, computational issues in stochastic processes and applied probability, and enterprise scale simulation. Dr. Elkins has served as an industry technical expert for the Department of Homeland Security University Based Centers of Excellence, Office of National Laboratories 2004 Program Review, and briefed the U.S. National Defense University / Industrial College of the Armed Forces on global manufacturing and supply chain risks. She holds a B.S. in Mathematical Physics from Sweet Briar College, Virginia, M.S. in Mathematics—Operations Research, and Ph.D. in Industrial Engineering—Operations Research from Texas A&M University. She also enjoys teaching Production Operations, and serves as an adjunct lecturer in the School of Management at the University of Michigan-Dearborn.