

OR 590 (Colloquium)
Fall 2007

Coordinator: Jeya Chandra; Office: 205 Leonhard; Phone: 863-2358;
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Requirements: Attendance for ALL SEMINARS and three in-depth seminar critiques. Attendance of ALL seminars is mandatory; appeals are required for any absence. Each unapproved absence requires one additional in-depth critique.

Absence: Absence of missed seminars must be appealed in writing to the coordinator. An appeal should have your name, student number, the date of seminar missed and the reason(s). The appeal must be delivered within one week of the absence. **E-mailed appeals are not acceptable.** You are encouraged to obtain approval before missing a seminar.

For each appeal which is not approved, you have to write one additional in-depth critique.

Guide Lines for In-Depth Critiques: If you are registered in OR 590 for credit, you are responsible for ‘in-depth’ critiques for three seminars this semester. The in-depth critiques should be three pages in length and double-spaced (font size 12). The critiques should discuss the major points of the seminar presentation, and assess their importance. The form of the critiques must follow the outline shown below. These in-depth critiques may be submitted to the coordinator at any time during the semester. The last day to submit the critiques is December 15, 2007 (5:00 pm.) **E-mailed critiques are not acceptable.**

OUTLINE FOR CRITIQUES

Title: A Review of “_____” (title of the talk) by
“_____” (name of the speaker.)

- I. Overview of Seminar Subject.
- II. Key Topics.
- III. Contributions of the Work Presented to the Tools or Practice of Operations Research
- IV. Assessment of the Presentation (as opposed to the work)
 - Transparencies
 - Other visual aids
 - Speaking style
 - Organization of the presentation
 - Addressing questions
- V. Summary (strengths, weaknesses and benefit you received by attending).

OR590-OPERATIONS RESEARCH COLLOQUIUM SERIES

Fall Semester 2007
Refreshments 4:15 PM, Seminar 4:30-5:30 PM
102 Leonhard Building

Go to the next page to see the abstract of the next talk

August 28	No seminar
September 4	Introduction, Requirements; Dr. M. Jeya Chandra, Chair, OR Program
September 11	Dr. Elsayed Elsayed, Professor of Industrial Engineering, Rutgers University. Title: "Investigation of Equivalent Step-Stress Testing Plans."
September 18	No seminar
September 25	Dr. Brian Rieksts, Research Staff Member, Institute for Defense Analyses, Washington D.C., Title: "Portfolio Optimization for Production Schedules of DoD Systems"
October 2	Dr. Ling Rothrock, Assistant Professor of Industrial Engineering, Penn State University. Title: "Modeling compensatory and noncompensatory decision making strategies in dynamic task environments."
October 9	Dr. Jack Hayya, Professor Emeritus, Supply Chain and Information Systems, Penn State University, Title: "Research in Stochastic Inventory Models."
October 16	Dr. Aurelie Thiele, Professor, Department of Industrial Engineering, Lehigh University. Title: "The value of information in inventory management under uncertainty."
October 23	Dr. Jose Ventura, Professor of Industrial Engineering, Penn State University. Title: "Power-of-Two Policies for Single-Warehouse Multi-Retailer Inventory Systems with Order Frequency Discounts."
October 30	Dr. Gul Kremer, Assistant Professor, Penn State University. Title: "Design Decision-making: A Portfolio of Complexities and Opportunities."
November 6	No seminar (INFORMS CONFERENCE)
November 13	Dr. Timothy Simpson, Professor of Industrial Engineering, Penn State University. Title: "Visual Steering for Trade Space Exploration: A Better Way to Optimize Complex Engineering Systems."
November 27	Dr. Murali, Assistant Professor, Department of Statistics, Penn State University. Title: "Experiments with automating Markov chain Monte Carlo (MCMC) algorithms."
December 4	Dr. Costas Maranas, Professor, Department of Chemical Engineering, Penn State University. Title: "Optimization based analysis of biological networks"



OPERATIONS RESEARCH

OR 590

December 4, 2007

4:15 – 5:30 PM

OPTIMIZATION BASED ANALYSIS OF BIOLOGICAL NETWORKS

Dr. Costas D. Maranas

Department of Chemical Engineering, Penn State University

In this talk we will discuss how systems engineering and in particular optimization concepts can be used to elucidate, analyze and redesign metabolic pathways leading to targeted overproductions of desired chemical products. Using as a starting point stoichiometric models of metabolism, we will first explore how optimization can be used to pinpoint which new functionalities to add into a microbial production host to endow it with new capabilities extracted from a curated database of thousands of reactions. Conversely, we will describe how to identify minimal reactions sets that can still support growth with implications to the design of organisms with minimal genomes. We will next briefly highlight a bilevel optimization based tool (i.e., OptKnock) for identifying gene knock-outs in a microbial production host leading to coupling of growth with the production of the desired chemical product. Finally we will explore how optimization can be used to analyze the topological properties of metabolic networks, identify possible gaps and suggest ways of filling them. Moving beyond metabolic networks, a similar mathematical framework will also be described for elucidating the input-output structure of signaling networks and for pinpointing targeted disruptions leading to the silencing of undesirable outputs in therapeutic interventions. The developed computational tools will be highlighted using a number of case-studies and some of the predictions will be contrasted with experimental results.

LOCATION: 102 LEONHARD BUILDING: **REFRESHMENTS:** 4:15 – 4:30 (outside 102 Leonhard)