PhD Summer Academy 2009
MIT-Zaragoza International Logistics Program
Welcome to the PhD Summer Academy 2009!

Although you are coming from different institutions, countries and backgrounds, one thing you all have in common is that you all have been selected to be part of a discussion forum of exceptional scholars in the area of logistics and supply chain management. I hope that you are as excited and eager as we are here in Spain to start this knowledge exchange journey!

The faculty and staff are looking forward to meeting and working with you, and we look forward to helping you adjust to life in Zaragoza.

Santiago Kraiselburd, PhD
Executive Director
Zaragoza Logistics Center
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· EMPIRICAL RESEARCH DESIGN
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The aim of the summer academy school is to create a strong knowledge discussion forum to boost research results and advances in supply chain management.

Get ready for intense sessions of studies and research!

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### FACULTY SCHEDULE

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<tr>
<th>Name</th>
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INSTRUCTORS BIOGRAPHIES

ODED BERMAN

Oded Berman is the endowed Sydney Cooper Chair in Business and Technology and the former Associate Dean of Programs at the Joseph L. Rotman School of Management at the University of Toronto. He received his PhD (1978) in Operations Research from the Massachusetts Institute of Technology. He had been with the Electronic Systems Lab at MIT, the University of Calgary, and the University of Massachusetts in Boston, where he was also the Chairman of the Department of Management Sciences. He has published over 190 articles and has contributed to several books in his field. His main research interests include operations management in the service industry, location theory, network models, and stochastic inventory control. He is an Associate Editor for Management Science and Transportation Science, and a member of the editorial board for Computers and Operations Research.

FERNANDO BERNSTEIN

Fernando Bernstein is an Associate Professor of Operations Management at the Fuqua School of Business, Duke University. He received his PhD in Operations Management from the Graduate School of Business at Columbia University in 2001.

Professor Bernstein's research interests include supply chain management, production planning and inventory control, applications of game theory for production and distribution systems, and revenue management.

He has published papers in leading journals such as Operations Research, Management Science and Manufacturing and Service Operations Management, and also acts as Associate Editor for these three journals. Professor Bernstein teaches the core Operations Management course and the Supply Chain Management elective course for the Full-Time and Executive MBA Programs at Duke University.

ROGER BLOEMEN

Roger Bloemen is Vice President Global Supply Chain for Solutia, based in Brussels, Belgium. Roger is managing the global supply chain for the Saflex division, with teams working for him in Singapore, China, Brazil, North America and Europe. Beyond running the operational supply chain, Roger is also very active in developing and implementing a global supply chain strategy, working with several institutions like NUS, MIT, Insead etc.

Before joining Solutia, Roger worked in several Supply Chain functions around the world for the Scotts Miracle Gro Company and Monsanto. In those assignments, Roger worked 5 years in the US, worked in Australia, France and Belgium.
Roger also has contributed to several Supply Chain publications and case studies on mathematical modeling and strategy in Supply Chain. He frequently gives lectures on Supply Chain strategy in the academic environment.

NICOLE DEHORATIUS

Nicole DeHoratius lectures MBA- and Executive-level courses on supply chain strategy and practice. Her research focuses on the effective management of retail supply chains and the link between retail performance and operational execution. Poor execution at all stages in the retail supply chain can result in store stockouts and, resulting in, lost sales. Effective execution involves designing appropriate incentives, maintaining accurate information, and a partnership between manufacturers and retailers.

DeHoratius received her DBA in technology and operations management from the Harvard Business School and her BA in history and science from Harvard College. Prior to her graduate studies, she was a researcher at RAND and was on the Board of Directors of the MIT Enterprise Forum of Washington-Baltimore, Inc.

DeHoratius has published articles in leading journals such as Harvard Business Review, California Management Review, Management Science, M&OM, Cutter IT Journal, and ECR Journal. In addition, her work has been featured in The Washington Post, Supply Chain Management Review, Capital Ideas, Bicycle Retailer and Industry News, and The University of Chicago Chronicle. In 2004 DeHoratius was named a Batten Scholar due to the impact and quality of her research and she is the recent recipient of a fellowship from the Sloan Industry Studies Program and a Unilever Research Grant. She is also a former Rotary Ambassadorial Scholar which enabled her to obtain her MSc in technology and innovation management from the University of Sussex in England.

DAVID GONZALEZ

David González is currently a Technical Fellow in General Motors R&D Center in Warren, Michigan. He leads the operations research and analysis team supporting GM's Global Purchasing and Supply Chain operations. He now has the responsibility for identifying substantial improvements and savings in current operations while also developing future cross-functional strategies and innovations.

In his previous assignment he was Director, Strategic Planning, Global Supply Chain, responsible for supply chain strategy, planning, and security in GM’s supply chains worldwide. In that role, he led the development of supply chain strategies for emerging markets and was responsible for coordinating the rapid growth of GM’s global supply chains. He was also responsible for implementing security regimes such as CTPAT and AEO in GM’s supply chains.
INSTRUCTORS BIOGRAPHIES

In his 20+ year career with GM, he has worked in GM’s R&D Center, Product Planning, Sales and Marketing, and Supply Chain functions as well as on special strategic initiatives. His international experience includes assignments for General Motors in Germany, Switzerland and Thailand. Dr. Gonsalvez has a B. Tech. in Mechanical Engineering from the Indian Institute of Technology, Madras and a Ph.D. in Operations Research from the Ohio State University.

DIMITRY KRASS

Dimitry Krass is a Full Professor of Operations Management and Statistics as well as the Area Coordinator for Operations Management, Management Science and Statistics at the Rotman School of Management. He joined Rotman in 1989 after receiving his PhD in Operations Research from Johns Hopkins University. His research interests include service operations, logistics, facility location and management issues, the study of distributive service systems, and analytical modeling in marketing. Over the last few years to the analysis of competitive location models, emergency response and public service system he has given particular emphasis. Professor Krass has wide consulting experience in number of projects in the areas of process design, marketing analytics and decision support systems for organizations ranging from Bell Canada, RIM, Toronto Police Service, Sears Canada, among others.

FABRIZIO SALVADOR

Fabrizio Salvador is Professor of Operations Management at the Instituto de Empresa Business School, Adjunct Professor at the MIT-Zaragoza Logistics Program and Research Affiliate at the Massachusetts Institute of Technology, where he is a founding member of the MIT Smart Customization Group. He was Faculty Research Associate at Arizona State University. He received his PhD in Operations Management from the University of Padova, where he previously graduated in Industrial Engineering.

Dr. Salvador research focuses on how operation strategy and organizational design can simultaneously achieve efficiency and flexibility. He has been researching such topics as mass customization, concurrent product-process-supply chain design and organization design to cope with input uncertainty. His research has been published in many prestigious academic journals such as Production and Operations Management, Journal of Operations Management, IEEE Transactions on Engineering Management, MIT Sloan Management Review, etc. He co-authored the book "Information Management for Mass Customization: connecting customer, front-end and back-end for fast and efficient personalization." He has been awarded over € 450,000 in research grants, from both public and private institutions, and has worked with numerous companies, such as John Deere, Electrolux, DHL, IBM, etc. in addressing operational problems associated with customization and product proliferation.
Dr. Salvador serves as associate editor of the Decision Sciences Journal and as reviewer for multiple academic journals. He has received numerous awards, including the 2007 Instituto de Empresa Business School Research Excellence Award, the 2004 Production Planning and Control Best Paper Award for the paper “Supply Chain Configurations for Mass Customization,” the 2005 Journal of Operations Management Best Paper Award for the paper "TQM Across Multiple Countries: Convergence Hypothesis vs National Specificity Arguments", the 2006 Outstanding Reviewer Award from the Decision Sciences Journal, and the 2007 and 2008 Shan Han Best Paper Finalist Award at the Academy of Management Annual Meeting - OM Division. He is member of AOM, DSI, INFORMS and POMS.

VINOD SINGHAL

Vinod Singhal is the Dr. Alfred F. and Patricia L. Knoll Professor of Operations Management at the College of Management at Georgia Institute of Technology. He is the Associate Dean for MBA programs, Area Coordinator for Operations Management, and the Associate Director for the Center for Paper Business and Industry Studies, an industry center funded by the Sloan Foundation. He received his PhD from the University of Rochester in 1988. His undergraduate major was in Mechanical Engineering and his graduate major was in Business Management. Prior to joining Georgia Tech in 1989, he worked for three years as a Senior Research Scientist at General Motors Research Labs.

His research has focused on the impact of operating decisions on accounting and stock market based performance measures. His research has been supported through grants from the US Department of Labor, National Science Foundation, the American Society of Quality, and the Sloan Foundation. He has published extensively in academic and practitioner publications and has been invited to present his research at many national and international practitioner conferences and universities. His research has been extensively cited in the media including Business Week, The Economist, Fortune, Smart Money, CFO Europe, Financial Times and Daily Telegraph.

Vinod is a departmental editor of Production and Operations Management, Associate Editor of Management Science and Manufacturing and Service Operations Management. He is a member of the editorial boards of IEEE Transactions, Journal of Operations Management, Operations and Supply Chain Management, An International Journal and Quality Management Journal. He has served on the Board of Examiners of the Georgia Oglethorpe Award, Bell South’s President Quality Award, and the Baldridge Board of Examiners.
USHIO SUMITA

Ushio Sumita received his PhD in 1981 from the University of Rochester, Rochester, New York, with his thesis entitled "Development of the Laguerre Transform Method for Numerical Exploration of Applied Probability Models." He became an Assistant Professor in the Department of Industrial Engineering at Syracuse University in 1981 and in 1982 the Simon School broke its tradition of not hiring its own graduate and gave him a position as an Assistant Professor. Upon graduation, Ushio became extremely productive in his research and supervised many research students. In 1987, he received his second PhD from Tokyo Institute of Technology with his second thesis entitled "First Passage Time Structure of Skip Free Markov and Semi-Markov Processes." A 1988 survey of published research in the fields of Applied Probability and Stochastic Processes ranked Ushio third worldwide for his research achievement. His involvement with the International University of Japan began as visiting professor in the winter term of 1991, followed by a joint appointment between the Simon School and IUJ from the Fall of 1991 through the Spring of 1995. In July, 1995, he became the position of the Dean of the Graduate School of International Management at IUJ and resigned from his visiting professorships at both the Simon School and the Stern School of Business at New York University in the United States. After reforming the research and educational programs at IUJ, he stepped down from the deanship in June 2000 and moved to the University of Tsukuba in July, 2001, as a full professor.
PROGRAM DESCRIPTION

EMPIRICAL RESEARCH DESIGN

SPEAKER: Fabrizio Salvador

DATES: 8/06, 9/06, 10/06, 11/06 and 12/06 (18 hours)

TOPIC TO BE DISCUSSED:

In this session the participants examine the process of theory building and testing, as well as the key factors affecting the validity of a research design. We will then examine these factors in the context of qualitative designs oriented towards theory building and in quantitative designs oriented towards theory testing based on survey research. The session is meant to give a holistic perspective to the process of doing research in the social sciences, increasing awareness in the student about typical fatal flaws in research designs and about possible ways to avoid them.

SESSIONS 1&2: What is Theory in Management Research?

- Essential elements of a theory
- Normative vs explanatory theory
- Variance, Process and Configurational theories


SESSIONS 3&4: What makes a piece of research "valid"?

- Construct, internal, external and statistical conclusion validity
- Sociology of the "interesting"
- Theory building as joining in a conversation
- Inductive vs hypothetic-deductive reasoning strategies


SESSIONS 5&6: Building theories from qualitative data: introduction and single-case designs

- Interpretivist, radical humanist, radical structuralist and functionalist paradigms
- Open, axial and pattern coding
- Theoretical vs statistical generalization
- Theoretical validation and the role of "deduction" in an inductive study


SESSIONS 7&8: Building theories from qualitative data: multiple-case designs and quasi-quantitative approaches
  · Logic of analytical generalization and comparative logic
  · Meaning categorization in large qualitative data sets
  · Critical incident technique and the statistical analysis of qualitative data


SESSIONS 9&10: Testing theories: measurement issues with latent constructs
  · Content and face validity
  · Reliability
  · Construct Univocity
  · Discriminant and convergent validity
  · Predictive, criterion-related and nomological validity


SESSIONS 11&12: Testing theories: evaluation of mediation and moderation effects individually and simultaneously
  · moderation vs mediation effects
  · moderation effects and the notion of "fit"
  · test of mediation effects with OLS and path analysis
  · test of moderation effects with OLS and path analysis
  · test of simultaneous and moderation effects: traditional and path-analytical approaches


Mathieu, John E. and Taylor, Scott R. "Clarifying conditions and decision points for mediational type inferences in Organizational Behavior." Journal of Organizational Behavior. 2006 Dec; 27(8):1031-1056; ISSN: 08943796.

USING SECONDARY DATA IN OPERATIONS MANAGEMENT RESEARCH: OVERVIEW, RESEARCH METHODS, AND RESEARCH OPPORTUNITIES

SPEAKER: Vinod Singhal
DATES: 15/06, 16/06, 17/06, 18/06 and 19/06 (15 hours)

TOPIC TO BE DISCUSSED:
Operations Management (OM) researchers are using publicly available secondary data to analyze the effect of operations decisions on corporate performance using metrics related to shareholder value and operating performance. This session will review the emerging research that links operations decisions to corporate performance. More specifically the session will cover the following:

· Discuss research methods and statistical techniques that can be used to measure short-term and long-term stock price effects, stock price volatility effects, and operating performance effects of operations decisions.
· Discuss data sources and approaches that can be used for conducting research using secondary data
· Discuss issues related to sample collection and hypotheses development.
· Discuss papers that have applied these approaches to operations management issues. We will review papers that use stock price and accounting data to research issues related to quality management, supply chain disruptions, inventory management, new product development, demand-supply mismatches, capacity management, investments in information technology, and environmental performance.
· Students will be required to write a brief paper where they outline how they will use the tools and techniques discussed in this session in relation to an operations management issue.

SERVICE SYSTEM DESIGN

SPEAKER: Dmitry Krass & Oded Berman
DATES: 22/06, 23/06, 24/06, 26/06, 29/06, 30/06, 01/07 and 03/07 (24 hours)

TOPIC TO BE DISCUSSED:
The session will cover some of the important research issues related to strategic and tactical aspects in the design of service systems. The session will be delivered over eight days (3-hr per day), days 1-4 to be given by Dmitry Krass and days 5-8 by Oded Berman.

WEEK 1: Strategic Aspects of Service System Design (Dmitry Krass)

· Public Facilities
  · Urban Hierarchy Planning
  · Model validation: data analysis and spatial correlation
· Private facilities: Competition
  · Modeling competition between facilities: basic approaches (Hotelling, spatial interaction models, etc)
  · Competition and Pricing
  · Competition and Facility Design
PROGRAM DESCRIPTION

WEEK 2: Designing Service Networks (Oded Berman)
  • Location and Inventory.
    • Inventory Pooling
  • Inventory in Service systems: using inventory in the provision of service (Oded Berman)
    • Interaction of inventory and queuing
  • Workforce Management
    • Workforce and work flow scheduling
    • Front-room / back-room balance
    • Workforce size
  • Capacity Planning
    • Interaction between service and demand
    • Modeling service-demand interactions in multi-facility networks

SUPPLY-CHAIN OPTIMIZATION

SPEAKER: Fernando Bernstein
DATES: 22/06, 24/06, 25/06, 29/06, 30/06 and 01/07 (18 hours)

TOPIC TO BE DISCUSSED:

Mathematical optimization is central to the methodologies of many business-related disciplines, including operations research, marketing, accounting, economics, and finance. In many of these areas, a solid background in optimization theory is essential for doing research. This session provides a rigorous introduction to the fundamental theory of optimization.

The session will emphasize applications of these tools to the optimization of supply chains. A firm’s supply chain consists of all processes and activities involved with product delivery -- beginning with the extraction of raw materials and ending when the product reaches an end user. These activities typically involve many different physical locations and may require decision making by many different individuals or companies. As a result, optimizing the performance of a supply chain can be an extremely complex task.

Session Outline
  • Review of Linear Algebra and Advanced Calculus. Separating/supporting hyperplane theorems
  • Classical optimization
    • Unconstrained optimization: Weierstrass Theorem, necessary and sufficient conditions for unconstrained local optima.
    • Constrained optimization: Theorem of Lagrange, KKT and Fritz-John conditions.
    • Convex sets and convex functions, implications of convexity for optimization.
    • Generalizations of convexity.
    • Duality in optimization problems: Duality Theorem, properties of dual problems, duality for convex problems.
    • Basic algorithms for unconstrained optimization.
- Parametric continuity and monotonicity
  - Parametric continuity and the Maximum Theorem. The Maximum Theorem under Convexity. Fixed Point Theorems and Nash equilibrium.
- Applications to supply-chain management

Towards the end of the session, students will present papers that use material introduced in the session. The following is a tentative sample of papers:


**Required Text**


**Session Work and Grading**

Several homework assignments will be given out during the session. There will be paper presentations and a final exam. The session grade will be the weighted average of homework (30%), presentation (20%), and final exam (50%).
PROGRAM DESCRIPTION

DYNAMIC ANALYSIS OF STOCHASTIC SYSTEMS AND ITS APPLICATIONS

SPEAKER: Ushio Sumita

DATES: 06/07, 07/07, 08/07, 09/07, 10/07 and 13/07 (18 hours)

TOPIC TO BE DISCUSSED:
The session is intended to introduce a variety of analytical tools in the areas of applied probability and stochastic processes, which are useful for modeling and solving realistic Operations Research problems. Theoretical topics include Markov chains in continuous time, semi-Markov processes, and queueing theory, where analytical tools such as sample path arguments, the method of supplementary variables, probability generating functions, Laplace transforms, and orthogonal functions will be covered. For applications, recent development in stochastic modeling in marketing, production management and financial engineering will be discussed.

FIELD RESEARCH DESIGN

SPEAKER: Nicole DeHoratius

DATES: 13/07, 14/07, 15/07, 16/07 and 17/07 (18 hours)

TOPIC TO BE DISCUSSED:
The objective of this session is to build the skills needed for conducting field research in organizations. Field research, defined as the "systematic studies that rely on the collection of original data - qualitative or quantitative - in real organizations" (Edmondson and Mcmanus 2007 p. 1155), plays an important role in our understanding of operational phenomenon. Such research can challenge, support, and/or extend existing theory and can also identify the lack of theory to explain observed phenomenon. Effective field research demonstrates a strong fit between the research question and the data used to address this question as well as between the findings and the implications drawn from these findings. We will explore these linkages through informal lecture, discussion, and practical exercises aimed to build one’s intuition about field research methods.

Suggested readings before arrival:
Improving Survey Questions: Design and Evaluation by Floyd Fowler (read whole book)
Analyzing Social Settings – A guide to qualitative observation and analysis (John Lofland, David Snow, et al.) (chapters 2-5, 7-9)
Grounded Theory in Management Research – Karen Locke (p. 44-141)
Learning from Strangers: The Art and Method of Qualitative Interview Studies by Robert Weiss (Chapters 3-5).
**NEW! INSIDER’S LENSES.**

This track will provide attendees with the chance to interact with industry experts who will introduce present and future challenges faced by supply chains. This session is the perfect opportunity to combine theoretical and technical/practical knowledge.

**SPEAKER:** Roger Bloemen  
**DATES:** 25/06 (4 hours)  
**TOPIC TO BE DISCUSSED:**

The Supply Chain is critical in the successful implementation of the business strategy. During this presentation, Roger will cover the process of building the Business Strategy, starting from the Automotive and Architectural Market dynamics and key company strengths. From the Business Strategy, the development process of the Supply Chain strategy will be covered. Roger will then elaborate on 3 critical Supply Chain research themes that address fundamental challenges going forward. Those themes will be on

- systems & operations research modeling  
- information management and information technology  
- development of a sustainable and differentiating supply chain strategy globally.

**SPEAKER:** David Gonsalvez  
**DATE:** 02/07 (6 hours)  
**TOPIC TO BE DISCUSSED:**

This workshop will focus on research challenges in the automotive industry’s supply chains. Even before the recent financial crisis, automotive supply chains were stressed by increased globalization, security regulation, and entry into new markets. Here, we will set the stage by discussing the automotive industry as it is today and describing the ongoing business of operating complex supply chains. We will then move into the research challenges in the “traditional” supply chain space – capacity planning, scheduling, transportation network management etc. Then we will frame the new challenges faced by supply chain managers as supply chains become more complex and require increased cross-functional and multiple tier interactions.

The opportunities for research and new tools that these challenges provide – such as trade network implications for tariffs, joint venture integration, and product complexity management – will then be framed. The intent is that this workshop provides the participants with an understanding of the world of automotive supply chains and with that appreciation, it will give them the motivation to work on some of these research challenges in the future.
The PhD Summer Academy 2009 program is administered under the MIT-Zaragoza International Logistics Program, one of the select MIT educational partnerships (http://web.mit.edu/facts/partnerships.shtml). Upon completion of all sections in which you have enrolled, you will be awarded a certificate stating that you have completed a PhD summer course under the MIT-Zaragoza program.
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