

50 Years of Management Science at Isenberg: Acknowledging the Past and Celebrating the Present and the Future

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50th Anniversary of the PhD Program at the Isenberg School
April 5, 2019



The First PhD Class



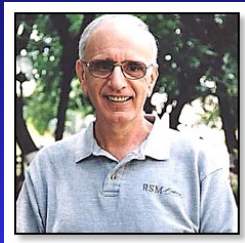
The first PhD class back in 1967. The above photo has the 10 students (all males) and their significant others. The University of Massachusetts Amherst was the first public university in New England to offer a PhD in business administration.

In the Past 50 Years

A total of 437 PhD students have received their doctorates in Business Administration from the Isenberg School and, of those, **83 have concentrated in Management Science.**

In the Past 50 Years

The first PhD graduate was Harvey J. Brightman (class of 1970). His dissertation advisor was Professor Eugene E. Kaczka (who became Dean of the School of Management at Clarkson University). **Brightman's concentration was Management Science!** Brightman is Regents Professor Emeritus of Managerial Sciences at Georgia State University (GSU). He is a Past President and a Fellow of the Decision Sciences Institute.



The title of his dissertation was: "Individual Behavior and the Small Work Group: A Simulation Study."

The Early Years

Until 1990, Professor Van Court Hare was the most prolific supervisor of doctoral dissertation in Management Science, having chaired 22 dissertations, with his first one in 1971.

Other faculty who also chaired dissertations in Management Science until 1990 were: Professors Joseph Balintfy, Eugene Kaczka, Meyer Belovicz, William Whiston, Sidney Sufrin, Wynn Abranovic, Craig Moore.

In the Past 50 Years

The first female PhD at Isenberg with a concentration in Management Science was Patricia M. Anderson, whose dissertation advisor was Professor Sidney Sufrin. She graduated in 1977.

The title of her dissertation was: “Capacity Utilization and Investment in Manufacturing: A Theoretical and Empirical Explanation.”

She would be 88 years of age, if still with us.

In the Past 50 Years

Since 1990, we have graduated 46 PhD students, and two are officially graduating in 2019: Yueran Zhuo and Pritha Dutta.

Wonderful to have Dr. Catherine Lerme Bendheim (class of 1992 - Professor Ali's student) and Professor June Dong (class of 1994 - my first female student) and Professor Shirley Shmerling (also class of 1994 and Professor Ali's student) with us today and many other alums!

Since 1990, we have had the following Professors chairing doctoral dissertations in Management Science: Professors Iqbal Ali, Soren Bisgaard, Stephen Coelen, Ahmed Ghoniem, Sara McComb, Craig Moore, Anna Nagurney, Robert Nakosteen, Alan Robinson, Senay Solak. Information Systems is now a separate track in our doctoral program but was under the Management Science track for a short period.

Our Faculty Now



Anna Nagurney

*Director, Virtual Center for Supernetworks, PhD
Coordinator & John F. Smith Memorial Professor,
Operations & Information Management*



Robert Nakosteen

*Department Chair & Professor, Operations &
Information Management*



Agha Iqbal Ali

Professor, Operations & Information Management



Senay Solak

*Honors Program Director & Associate Professor,
Operations & Information Management*



Ahmed Ghoniem

*Associate Professor, Operations & Information
Management*



Priyank Arora

*Assistant Professor, Operations & Information
Management*



Alan G. Robinson

*Professor, Operations &
Information Management*



Michele Burch

*Senior Lecturer, Operations & Information
Management*



Shirley Shmerling

*Senior Lecturer II, Operations & Information
Management*

In the Past 50 Years

Also, it is important to mention that our Department has evolved from being the **Department of General Business and Finance** to **Finance and Operations Management** to even **Finance and Operations and Information Management**, to, following a separation from Finance, the **Department of Operations and Information Management**!

Where Are Our Management Science PhD Alums (1990 Onwards) Now?

Adelphi University
Babson College
Central Washington University
Colorado School of Mines
College of the Holy Cross
IESEG School of Management
Manhattan College
Merrimack College
Pennsylvania State University
(Hazleton and Great Valley
campuses)
Roger Williams University
Sacred Heart University
Saint Mary's College
State University of New York at
Oswego

Texas Wesleyan University
University of Alabama Birmingham
University of Connecticut
University of Idaho
University of Massachusetts Amherst
University of Massachusetts Lowell
University of Michigan Dearborn
University of Nebraska
University of Portland
University of San Francisco
University of Sydney
University of Washington Bothell
Vienna University of Economics and
Business
WPI
York University

Where Are Our Management Science PhD Alums (1990 Onwards) Now?

Decision Sciences

FedEx

MathWorks

Mass General Hospital - Institute for Technological Assessment

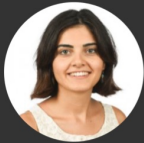
Microsoft

Nature Source Improved Plants

SAS

WISER (World Institute for Strategic Economic Research)

Our Isenberg Management Science PhD Students Today



Deniz Besik



Pritha Dutta



Amro M. El-Adle



Emre Eryigit



Zhangchen Hu



Mojtaba Salarpour



Wei Wei



Yueran Zhuo

Striving for Excellence in Research, Teaching, and Service

Our program in Management Science emphasizes excellence in all three dimensions.

Research

- Our doctoral students start conducting research early in the PhD studies. We now have a core exam paper requirement at the end of the first year. Our students publish journal articles with their advisors and this helps to launch them on their subsequent careers.
- Our doctoral students in Management Science are consistently recognized with the **Outstanding Doctoral Student Research Award** given by the Isenberg School annually: Heng Chen, Tulay Flamand, Dong Li, Mohammad Reihaneh, Sara Saberi, and Min Yu.
- In addition, several of our doctoral students have received the prestigious **Isenberg Scholar Award**: Sara Saberi and Yueran Zhuo.

Striving for Excellence in Research, Teaching, and Service

Research: Examples of a Few Recent Dissertation Titles

Quality Competition in Supply Chain Networks with Applications to Information Asymmetry, Product Differentiation, Outsourcing, and Supplier Selection, Dong Li, PhD, 2015.

Retail Analytics and Optimization for Store-Wide Shelf-Space Management, Tulay Flamand, PhD, 2016.

Service Improvement and Cost Reduction for Airlines: Optimal Policies for Managing Arrival and Departure Operations under Uncertainty. Heng Chen, PhD, 2016.

Network Game Theory Models of Services and Quality Competition with Applications to Future Internet Architectures and Supply Chains, Sara Saberi, PhD, 2016.

Game Theory for Security Investments in Cyber and Supply Chain Networks, Shivani Shukla, PhD, 2017.

Integrated Routing Models for Enhanced Product and Service Delivery, Mohammad Reihaneh, PhD, 2018.

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Four of our doctoral students have earned national dissertation awards: Dr. Padma Ramanujam, Professor Qiang “Patrick” Qiang, Professor Deanna Kennedy, and Professor Heng Chen (who also won an INFORMS best paper award with his advisor Professor Senay Solak).

And, upon graduation, our doctoral student alums continue to receive accolades for their research with a variety of awards: Professors Jose M. Cruz, June Dong, Dong “Michelle” Li, Zugang “Leo” Liu, Fuminori Toyasaki, Min Yu, and Tina Wakolbinger, to name just a few.

Professor Iqbal Ali received the Goodeve Medal for the best paper, co-authored with Dr. Guven Ince, published in 2017 in the *Journal of the Operational Research Society*.

And, speaking of “meteoric” academic careers, our keynote speaker, Professor Tina Wakolbinger, achieved Full Professorship only 4 years after her PhD!

Active Presenters at Conferences and Also Hosts of Speakers



Striving for Excellence in Research, Teaching, and Service

Research

Many research collaborations of our PhD alums continue with Isenberg faculty, alums, and even present doctoral students. Sustained networks have arisen even spanning academic generations.



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Discrete Optimization

An accelerated branch-and-price algorithm for multiple-runway aircraft sequencing problems

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ABSTRACT

This paper presents an effective branch-and-price (BnP) algorithm for the multiple-runway aircraft sequencing problem. This approach improves the tractability of the problem by several orders of magnitude when compared with solving a classical 0-1 mixed-integer formulation over a set of computationally challenging instances. Central to the computational efficacy of the BnP algorithm is solving the column generation sub-problem as an elementary shortest path problem with aircraft time windows and zero triangular separation times using an enhanced dynamic programming procedure. We address in our computational study the algorithmic features that contribute to user experience, to accelerating the proposed dynamic programming procedure and, hence, the overall BnP algorithm.

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1. Introduction & literature review

Sustained growth in air traffic volume worldwide and rising air-line delay costs continue to motivate research related to airport operations management. Aircraft sequencing problems (ASP), in particular, have motivated a great deal of academic research because runways constitute a major bottleneck at airports. From a modeling viewpoint, Abad, Abramo, Krishnamoorti, De Silva, and Mills (1995) developed a mixed-integer programming (MIP) formulation for a single-runway aircraft sequencing problem that is solved using a branch-and-bound (BB) algorithm. Likewise, Elm, Krishnamoorti, and Stone (1999) and Isenberger, Krishnamoorti, Sherali, and Nourmohammadi (2009) investigated 0-1 mixed-integer programming formulations with dispatch constraints for airport operations. In a single-runway and multiple-runway aircraft sequencing problems, Bianco, D'Ariano, and Cavallaro (1999) proposed an MIP formulation that is based on the similarity between aircraft sequencing problems over a single runway and asymptotic traveling salesman problems (ATSP). This was further explored in Choukri, Sherali, and Jain (2014), where valid inequalities, preprocessing routines, and information-laboratory technique constructs were developed to improve the tractability of computationally challenging single-runway aircraft sequencing problems.

Isenberger and Solferino (2014) demonstrated that, when aircraft are partitioned into subgroups based on their weight class, effective preprocessing routines can be derived and incorporated into classical formulations to improve the problem tractability. In particular, Newman was able to investigate the incorporation of practical considerations. For example, the notion of constrained position shifting has been examined in Vindakovich, Barrow, and Ozbay (1993), Barrow, D'Ariano, and Gendreau (2006), and Balakrishnan and Chandan (2005). To name a few, further, Arinola, Bapcar, and Dini (2001) developed a branch-and-cut approach for solving an aircraft sequencing problem with holding patterns where each aircraft is assigned to one time-window from a set of disjoint options with the objective of minimizing the minimum separation between consecutive aircraft landings. Souter and Fries (2008) considered a tactical, single-runway problem in which airline companies express a cost function related to their delay and a heuristic is developed to find a schedule that accommodates their preference.

Although issues involving combined aircraft arrival-departure problems or multiple runways have been examined to some extent, the survey by Isenberger, Isenberger, and Potts (2011) indicates that single-runway aircraft landing problems have received greater attention. It also suggests that such aircraft sequencing problems are commonly solved using dynamic programming (DP) algorithms, MIP algorithms, and metaheuristics. To date, competitive branch-and-price (BnP) algorithms for the multiple-runway aircraft sequencing problem (MRASP) have not been reported in the literature. Despite this, there is a need to develop a BnP algorithm for MRASP.



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Production, Manufacturing, Transportation and Logistics

How to increase the impact of disaster relief: A study of transportation rates, framework agreements and product distribution

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ABSTRACT

Due to restricted budgets of relief organizations, costs of hiring transportation service providers (over distributive decisions) and loss of the impact of disaster relief. To improve the success of these humanitarian operations, it is of paramount importance to understand this relationship in detail and to derive the right logistics scheme, always considering the interdependencies between multiple sub-problems in humanitarian logistics. In this paper, we develop a game-theoretic model in order to investigate the influence of transportation costs on distributive decisions in large-scale relief operations and to evaluate measures for improving the efficiency of humanitarian relief. The application of the model is Generalized Nash Equilibrium, which has had few applications in the supply chain context to date. We formalize it, solving the concept of a Variational Equilibrium, as a Variational inequality and perform numerical simulations in order to study the effects of these interdependencies. An increase in carrier competition, a reduction of transportation costs and an extension of framework agreements, the results yield important implications for policy makers and humanitarian organizations (HGOs), increasing the number of provided containers, strengthening the bargaining power of HGOs and improving supply up to a certain level. The latter is reached when voluntary or framework costs exceed transportation and costs. Selection of transportation costs have a consistently positive, but decreasing marginal benefit without any upper bound. They provide the highest benefit when the bargaining power of HGOs is weak. For the contrary, increasing framework agreements enable great improvements when the bargaining power of HGOs is strong.

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1. Introduction

Sudden-onset disasters such as the Indian Ocean tsunami, Hurricane Katrina or the Haiti earthquake have had catastrophic consequences. Loss caused by the media and academics are also most dramatic (Shelton, Simister, Simister, & Housman, 2006; Latorre, de Brito, J. Castro-Ferre, Rajan, Ferreira, & Regueira, 2010; Wenzel, 2010). These are actually cases where media have to the affected population that makes them even more through they allow for longer reaction times (Latorre & Wenzel, 2010). One striking element is the 80 billion people worldwide suffering from chronic malnutrition due to drought and flooding (World Food Programme, 2012). During disaster relief operations,

humanitarian organizations (HGOs) alleviate the suffering of victims through the distribution of relief supplies. As the available funds are restricted, HGOs have to decide on how to allocate limited supplies to different groups of beneficiaries in order to maximize their impact. Quite often, HGOs do not succeed in this critical task and achieve only a sub-optimal result (Latorre & Wenzel, 2010; Latorre, de Brito, J. Castro-Ferre, Rajan, Ferreira, & Regueira, 2010; Wenzel, 2010). Among the reasons for such malperformance are inaccurate need assessments, competition for media attention and to some extent the lack of information. But also costs of transportation often compromise allocation decisions because freight is a major spend category in all relief operations and can heavily reduce the available budget. Given that HGOs largely rely on

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Teaching

Our doctoral students are required to teach. They, typically, begin teaching in their third year of the program and continue to teach a course each semester until graduation, unless they are supported by outside funding, such as an NSF grant.

Having teaching experience not only helps a student decide whether he/she wants to go on the academia track. Also, if that is the case (and that is for the majority of our doctoral students), then a nice teaching portfolio is built before the student enters the academic job market.

Striving for Excellence in Research, Teaching, and Service

Teaching

Our Management Science doctoral students are now often assigned to teach the required Business Analytics (Statistics) course for all business majors in a face to face format. Options for students to teach online after their fourth year (including the summer) and in the fifth year also exist.

Our doctoral students also excel in teaching. For example, Farbod Farhadi and Shivani Shukla received the Isenberg Outstanding Doctoral Student Teaching Award.

As Professors, Drs. Jose Cruz, Trisha Woolley Anderson, Dong "Michelle" Li, Dmytro Matsypura, and Fuminori Toyasaki have all been recognized from their academic institutions with teaching awards. Our very own, Professors Shirley Shmerling and Michelle Burch, have received awards from the Isenberg School for teaching!

Striving for Excellence in Research, Teaching, and Service

Service

Since 2004, a vital outlet for our students has been the UMass Amherst INFORMS Student Chapter, which was founded in 2004, and whose first President was Tina Wakolbinger!



The Chapter has garnered 12 consecutive national awards for its activities, which includes a Speaker Series. I have had the pleasure of serving as the chapter's Faculty Advisor since its inception (15 years).

Striving for Excellence in Research, Teaching, and Service

Service

The Chapter has hosted renowned speakers from academia and industry, and many of our doctoral students have served as Chapter Officers, acquiring professional and leadership skills. And it has started its own youtube channel with interviews with speakers posted.



Several of our former doctoral students having been recognized by INFORMS with the **Judith B. Liebman Award**: **Tina Wakolbinger**, **Qiang “Patrick” Qiang**, and **Amir H. Masoumi**.

Striving for Excellence in Research, Teaching, and Service

Service



The Future

The future is bright; yet, challenging.

We are welcoming the first female Dean of Isenberg, Dr. Anne P. Massey, who will be starting in the Fall of 2019. She has graduate degrees in Industrial and Systems Engineering from RPI and was a long time member of the Kelley School at the University of Indiana and the former Dean of the Business School of the University of Wisconsin. She will also be joining our department.

There are now challenges associated with attracting international grad students.

We would love to hear from our PhD alums as to how we can improve recruiting of doctoral students and we could definitely use your support!

Thank you!

And, after a short break, we will reconvene for the Management Science panel of esteemed alums.

