



The Business of EDUCATION

*Teaching

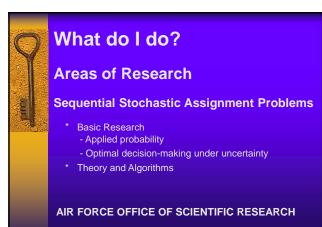
- Classroom - Advising (UG & G)

*Research

- Publication & Scholarship - Grants (Government) & Contracts (Industry) - Seminars & Lectures

*Service

- Department, University, National - Professional
 - Consulting
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Aviation Security System Analysis

- * Aviation Baggage Screening Security System Design
 - * False Alarm / False Clear Tradeoffs

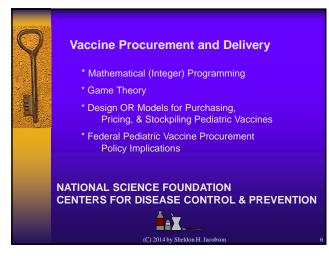
 - * Control Theory * Markov Decision Processes * Optimal Asset Allocation

 - * Optimal Decision-Making

* Aviation Security National Policy Implications

NATIONAL SCIENCE FOUNDATION TRANSPORATION SECURITY ADMINISTRATION

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Political Redistricting and Gerrymandering

- * Mathematical Modeling for Designing Congressional Districts Equitably
- * Novel Graph Theory Concepts to Overcome Stringent Design Criteria
- * Implication on Which Political Party Controls Power in Congress

NATIONAL SCIENCE FOUNDATION

Balance Optimization Subset Selection for Causal Inference Experimental Design

- * Novel Approach to Design Causal Inference Experiments in the Social Sciences and Medicine.
- * Exploit Discrete Optimization Structure within a Statistical Framework
- Implications on Decision-Making Process within Numerous Industries (Pharm., FDA, EPA, ...)

* BIG DATA

NATIONAL SCIENCE FOUNDATION



Laws that Ban Cell Phones While Driving and Accident Rates

- * Controversial Public Issue
- * Novel Approaches to Analyze Data to Weed Out New Insights on this Issue.
- * Implications on Public Health Safety and Legislation

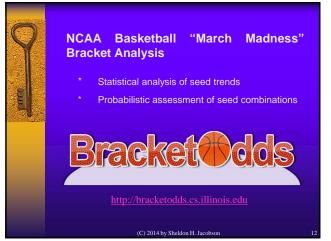
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Fuel Consumption, Energy, and Obesity

- * Engineering Economic Analysis
- * Public Health and Transportation Implications
- * Attracts Wide-Spread National Attention









Screening for Ebola at Airports

Similarity to aviation security screening.





CBC News, Toronto, Canada, 11 October 2014

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How Does One Begin to Do Research on a Topic?

Aviation Security



Aviation Security

Thought it was an interesting problem that would lend itself to operations research methodologies

Started research in the area in 1994 (with JE Kobza)

Published first paper in the area in 1996

Kobza, J.E., Jacobson, S.H., 1996, "Addressing the Dependency Problem in Access Security System Architecture Design," *Risk Analysis*, 16(6), 801-812.

Awarded small contract from FAA in 1999

Awarded NSF grant (on Sept. 1, 2001, by R. Rardin)

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Aviation Security

Became a known entity within the TSA (2001)

Quoted in Congressional briefing (2001)

Briefed the Office of Science and Technology, in the Executive Office of (former) President George W. Bush (2002)

Academic Activities:

Published 30 research papers on the topic

Directed three Ph.D. dissertations, three M.S. theses

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Served on TSA internal review panels (2004, 2007)

- Awarded Aviation Security Research Award from Aviation Security International (2002)
- Awarded a Guggenheim Fellowship (2003)
- Awarded Outstanding IIE Publication Award from Institute of Industrial Engineers (2009)

Produced video "Aviation Security: Researching the Risk" (2006)

- Co-editing special issue of *IIE Transactions* (Homeland Sec.) (2005-2006)
- Awarded NSF grant (on August 1, 2009, by D. Wenger)
- Invited to provide commentary featured in *Will Profiling Make a Difference?* on the **New York Times** web site: Room for Debate (2010)
- Runner-up, 2010 Christopher Columbus Fellowship Foundation Homeland Security Award (Transportation & Border Security)

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Multiply what was just described by 3000+ faculty and you have what is the University of Illinois



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Research

is what will Allow the Degree that you will earn from the **University of Illinois**

Grow in Value!

Recent Ph.D. Graduate Students

Doug King, Ph.D. '12 (IE)

Congressional District Optimization using Graph Theory NCAA Basketball March Madness

Fuel Obesity Analysis

2009, Uofl College of Engineering Mavis Memorial Fund Scholarship, 2010 Uofl College of Engineering Mavis Future Faculty Fellowship, 2012 Finalist, Best Paper Award, INFORMS Section on Public Policy, Services and Needs, 2012 Semi-Finalist, Advances in Analytics Award, INFORMS Analytics

Societ

Society, 2013 IIE Pritsker Doctoral Dissertation Award Competition, 2nd Place.

Recent Ph.D. Graduate Students

Banafsheh Behzad, Ph.D. '14 (IE)

Sequential Stochastic Assignment Obesity and Transportation Pediatric Vaccine Pricing using Game Theory

2013 Gilbreth Memorial Fellowship, Institute of Industrial Engineers (IIE).

Current Ph.D.
Graduate StudentsJason Sauppe (CS)Balance Opt. Subset Selection
Discrete Optimization
Cyclic Best First Search
Election ForecastingArash Khatibi (IE)Sequential Stochastic Assignment
NCAA Bracketology

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What I Tell my Graduate Students

Goal for My Students:

- •Do the highest quality research
- •Publish the highest quality papers
- •Win the most prestigious national awards
- •Get the best possible position

My Job: Help them achieve all these goals

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Some Awards Won by My Graduate Students

INFORMS Cloge E: Nichoson Student Paper Competition (Frobrotatio Membroh). INFORMS Computing Society Student Paper Competition (Runner-Up) INFORMS Control Dissertation Science & Logistics Dissertation Prize (Honorable Mention) IIE Pritiske Doctral Dissertation Award Competition (1^{er} Place, 2^{red} Place, 3^{er} Place) IIE Graduate Research (Master's Thesis) Award Competition, (1^{er} Place, 2^{red} Place) IIE Graduate Research (Master's Thesis) Award Competition, (1^{er} Place, 2^{red} Place) IIE Graduate Student Research Leave Fellowship (Runner-up) AFOSR Graduate Student Summer Research Fellowship Award. VT Paul E: Torgersen Graduate Student Research Excellence Award (Second Place) UI hb. Thesis Initiation Fellowship, Program in Ams Control, Disarmament, & Int. Security UI M&IE Harper Safety Award (2) Federal Aviation Admin. / USDOT Grad. Research Award on Public-Sector Aviation Issues UI COE Mavis Graduate Fellowship (2) National Science Foundation Graduate Fellowships (2) NSEG Graduate Fellowship (2) UI CS Grad Expo Top Team Presentation

LUL I

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Questions for my Graduate Students

What are we doing today to make our research group the best in the country?

How can I help you to facilitate this goal?

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