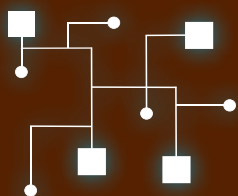


# INDUSTRIAL AND SYSTEMS ENGINEERING

FALL NEWSLETTER 2023



## A new Era for the Lehigh ISE PhD Program



**LEHIGH**  
UNIVERSITY

P.C. Rossin College  
of Engineering and  
Applied Science



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Sheila Dorney at  
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Dear Lehigh ISE Community,

Welcome to our Fall 2023 Newsletter! I hope you are enjoying the change of seasons! At Lehigh ISE, our students, faculty, and staff are enjoying a beautiful autumn campus that is alive with vibrant energy!

Foremost, let me begin with some very good news. You may have already heard that the Wall Street Journal released new ratings earlier this fall, which ranked Lehigh at #14 out of 400 schools! Please read the full newsletter to learn more about the methodology used.

Summers are a very productive time in ISE and this summer was no different. ISE was privileged to host the 2023 edition of the prestigious **Gene Golub SIAM Summer School** from July 30, 2023 – August 12, 2023. This event brought together 42 UG, Master's, and PhD students from around the world to learn about Quantum Computing and Optimization.

Our 23rd annual **Modeling and Optimization: Theory and Applications (MOPTA 2023) Conference** was held from August 16 – 18, 2023. The conference consisted of 7 plenary talks from leaders in the field and 32 parallel sessions, a poster competition, and the **15th AIMMS-MOPTA Competition**. Over 140 participants attended the conference.

During both the SIAM Summer School and MOPTA, participants were fortunate to enjoy a **Spencer C. Schantz Distinguished Lecture**. Lehigh ISE was honored to have Dr. Angela Grassellino, Senior Scientist, Fermilab, and Director of the National Quantum Information Science (SQMS) Center as a keynote speaker of the **2023 Gene Golub SIAM Summer School**. Dr. Grassellino delivered the **Spencer C. Schantz Distinguished Lecture** “Enabling Scientific Discovery in Quantum Information Science at the Superconducting Quantum Materials and Systems (SQMS) Center” on July 31, 2023.

Lehigh ISE welcomed another remarkable speaker, Dr. Julie Ivy, North Carolina State University as she delivered the **ISE-COH-HSE Spencer C. Schantz Distinguished Lecture** titled, “Learning from Data for Decision Making in Health and Humanitarian Logistics: Insights and Challenges in a World with Increasing AI”, on Friday, August 18, 2023.

On Sunday, August 27, 2023, undergraduate and graduate degrees were awarded to our ISE summer graduates. You may read the full list of ISE graduates in this newsletter.

With the conclusion of the 2023 summer events and the start of the fall semester, Lehigh ISE announced the recent redesign of its **ISE PhD Program**. The redesign includes a new curriculum and streamlined sets of requirements and milestones to provide

students with the foundational skills necessary to do cutting-edge research as efficiently as possible.

The annual **ISE Career Fair** created solely for ISE undergraduate and graduate students was held on September 20, 2023. This event draws a variety of industries and provides an intimate environment for both students and potential employers to connect and discuss intern and employment opportunities.

Our outstanding faculty continues to shine. I am pleased to share the most recent achievements of our faculty. As our research initiatives at Lehigh are expanding, with plans for growth and excellence in the research community, I am pleased to announce that ISE Professor **Ted Ralphs** in a continuing partnership with the University of Pittsburgh won a second three-year, half-million dollar grant from the Office of Naval Research for research on bilevel optimization.

In recognition of outstanding contributions to the advancement of Operations Research, Professor **Ralphs** was most recently elected a **Fellow of the Institute for Operations Research and the Management Sciences (INFORMS)**. This honor is reserved for a few select members of INFORMS who have demonstrated outstanding accomplishments in operation research in the management sciences.

Assistant Professor **Aida Khajavirad** was awarded the **2023 INFORMS Computing Society Prize**. The prize was given to Professor Khajavirad and Professor Albert Del Pia (University of Wisconsin-Madison) for their work on “convexification for mixed-integer polynomial optimization” based on a series of 7 papers.

Assistant Professor **Karmel S. Shehadeh** continues to excel in her academic career. Four of her most recent accomplishments are highlighted in this Newsletter number.

Our Lehigh ISE doctoral students are excelling in INFORMS and IISE competitions and other programs. These awards give credence to our students' excellent academic reputation. You will be able to read about the achievements and accolades of our PhD students **Brendan Ruskey, Mohammadhossein Mohammadisiahroudi, Man Yiu (Tim) Tsang, and Adrian Harkness**.

In closure, I would like to include a gentle reminder that we are getting closer to the 100th Year Anniversary of Industrial and Systems Engineering education at Lehigh. We will celebrate this milestone in the academic year 2024-2025. We still have sponsorship opportunities available for a terrific lineup of events. There are many perks to join as a sponsor and we hope you will support us in this centennial celebration!



**LUIS NUNES VICENTE**

Timothy J. Wilmott Endowed Chair Professor and Department Chair  
Department of Industrial and Systems Engineering, Lehigh University

# ISE FACULTY & STAFF NEWS

# news



TED RALPHS

## *Lehigh ISE faculty Ted Ralphs has been elected a Fellow of INFORMS*

Lehigh ISE Professor **Ted Ralphs** has been elected a Fellow of the Institute for Operations Research and the Management Sciences (**INFORMS**). This honor is reserved for few select members of INFORMS, and in fact this year only twelve members have been elected Fellows. The newly elected Fellows were honored at a luncheon on October 16, 2023 during the 2023 INFORMS Annual Meeting in Phoenix.

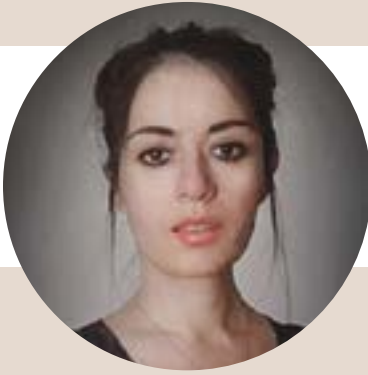
The **INFORMS Fellow Award** is given to recognize sustained contributions of individuals who have demonstrated outstanding accomplishments in operations research and the management sciences in research, practice, management, education or service.

Prof. Ralphs' research focuses mainly on various aspects of large-scale computation and optimization. His research spans theory, computation, and application, with an aim of bridging the gap between theory and practice. His current research projects explore the theoretical and computational aspects of solving large-scale optimization problems through the exploitation of sophisticated mathematical techniques and high-performance computing technologies. He has directed of the Computational Optimization Research at Lehigh (COR@L) Laboratory, chaired of the INFORMS Computing Society, and co-chaired Lehigh's Research Computing Steering Committee.

"It is indeed a great honor to be elected a Fellow of a society I grew up with, founded the same year I got my Ph.D. Throughout my career, INFORMS has been there and has helped guide me through all the stages of career development. This recognition means a lot." says Ted Ralphs.

# ISE FACULTY & STAFF NEWS

# news



## *Lehigh ISE faculty Aida Khajavirad was awarded the 2023 INFORMS Computing Society Prize*

**AIDA KHAJAVIRAD**

We are extremely pleased to announce that Lehigh ISE Assistant Professor **Aida Khajavirad** was awarded the **2023 INFORMS Computing Society Prize**. The prize was given to Prof. Khajavirad and Prof. Alberto Del Pia (University of Wisconsin-Madison) for their work on “convexifications for mixed-integer polynomial optimization” based on a series of 7 papers. This is Aida’s second INFORMS award, after the 2017 Optimization Society Young Researchers Prize.

Khajavirad’s research has covered the advancement of the state-of-the-art in Mixed-Integer Nonlinear Optimization (MINLP) at theoretical, algorithmic, and software levels. Her research has built upon and combined ideas from convex analysis and optimization, integer programming and combinatorial optimization, and constraint programming. Recently, Aida has become interested in designing and implementing efficient optimization algorithms with performance guarantees for applications arising from data science.

In the words of Dr. Aida Khajavirad “We are thrilled and honored to learn that our decade-long collaboration on mixed-integer polynomial optimization has been recognized by the ICS prize. We would like to thank our nominators and the prize committee for considering our work.”

# ISE FACULTY & STAFF NEWS

## news



### *Lehigh ISE faculty Karmel S. Shehadeh continues to make a difference in the operations research community*

**KARMEL S. SHEHADEH**

Hired in the Fall of 2020, Lehigh ISE Assistant Professor **Karmel S. Shehadeh** continues to excel in her academic career. This article brings together three of her most recent achievements as a rising star in the field of industrial engineering and operations research.

In a recognition of her service to the community, Professor Shehadeh was elected as Vice President/President Elect (2023-2024) of the of the **INFORMS Junior Faculty Interest Group (JFIG)**. Founded in 2001, the mission of JFIG is to create a forum to increase junior faculty interaction with each other, with senior faculty, and with industry, and to provide opportunities for networking and collaborative research. More recently, Professor Shehadeh was elected Executive Vice President for the **INFORMS Section on Location Analysis (SOLA)** 2024-2025. SOLA's mission is to promote the development of analytical methods, tools, and techniques in the traditions of operations research as applied to the study of facility location. The Executive Vice President will be the presumptive nominee for the office of President of the Section after their term office as Executive Vice President.

As a testament of her research work in the field of transportation, Professor Shehadeh was recently invited to join the Early Career **Editorial Advisory Board of Transportation Research Part C: Emerging Technologies**. TR-C is one of the premier journals in transportation, and it has an extraordinarily high impact factor. It is remarkable that Karmel has received this invitation so early in her career. Members of Editorial Advisory Board are typically invited based on a recommendation from one of the associate editors or selected given their significant contributions to the journal as author and reviewer.

Professor Shehadeh's contribution to the review of scientific articles is not short of deserved accolades. She was again selected by the **Transportation Science** editorial board to receive a Meritorious Service Award in appreciation of her efforts as a reviewer for the journal. This **Meritorious Service Award** recognizes associate editors and reviewers who have offered exceptional service to the journal in the review process. The 2023 awardees were announced at the INFORMS annual meeting and the list of awardees will appear in the November/December issue of the journal.

# research grants



TED RALPHS

## *Lehigh and UPitt won a second Naval grant for research on bilevel optimization*

Lehigh ISE Professor **Ted Ralphs**, in a continuing partnership with Professor Oleg Prokopyev at University of Pittsburgh, has won a second three-year, half-million dollar grant from the **Office of Naval Research**. The proposed research is to develop next-generation algorithms for bilevel optimization problems. Multilevel optimization is a framework for modeling and analysis of games and other hierarchical decision processes involving two or more decision-makers, known as “players” in game theory parlance. The players make decisions in turn based on their own objectives with each player choosing from a set of actions limited by the moves made previously by other players.

The case under study is that of two players who make one move each, well-known as the Stackelberg game. The players may be, for examples, companies or military units, and the actions to be taken may involve many inter-linked decisions, such as how much money to invest in various available projects or how to harden a complex network to defend it against damage. Despite there being only two moves, this kind of game may already be difficult for modern computers to analyze. In the long-run, the hope is to use this simple two-level game as a kind of laboratory for the multi-level ones.

One of the key questions that Ralphs and Prokopyev plan to study is what can be learned by solving certain related but easier-to-analyze games obtained by relaxing the rules in some way. Such relaxations can yield bounds on the best outcome that can be expected and can guide the search for the optimal strategy. Ultimately, the methodology developed will make its way into open-source software that is being available not only to the research community, but companies and government agencies as well. The open-source package MibS (<https://github.com/coin-or/MibS>) has been under development at Lehigh since 2007.

“We are extremely pleased that the Office of Naval Research has entrusted us with this funding for the ongoing development of techniques for analyzing this important class of problems. Without this funding, it would not be possible to develop the open-source software that we are able to make freely available through this support.” says Ted Ralphs.

# Lehigh ISE Doctoral students excel in INFORMS and IISE competitions and programs



**BRENDAN RUSKEY**

## Brendan Ruskey won 2nd Prize in the IISE Thesis Pitch Competition

Lehigh ISE is proud to announce that PhD student **Brendan Ruskey** won a Second Prize in the IISE Thesis Pitch Competition in the People and Systems Category for his 3-minute pitch **Optimization models for voting and election administration**, under the supervision of Lehigh ISE Professor Lawrence V. Snyder. The award was received on May 22, 2023, at the IISE Conference & Expo during a luncheon with the Council of Industrial Engineering Academic Department Heads (CIEADH). Lehigh ISE PhD students Griffin Kent and Zeguan Wu were also among the participants in the competition.

Lehigh ISE rising seniors Owen Brown and Brooke Cannon attended the IISE Undergraduate Colloquium as representatives of our ISE UG class, in what was by far one of the largest and most dynamic academic representations.

The Annual Conference & Expo of the **Institute of Industrial and Systems Engineering** is the foremost conference for industrial and systems engineering, where the best-in-the-field as well as promising colleagues and students can meet to network, learn about advancements in the industry, and build rewarding and life-long relationships.



**MOHAMMADHOSSEIN  
MOHAMMADISIAHROUDI**

## Mohammadhossein Mohammadisiahroudi was selected runner-up at the INFORMS Computing Society Paper Award competition

Lehigh ISE is pleased to announce that PhD student **Mohammadhossein Mohammadisiahroudi** was a selected runner-up for the **INFORMS Computing Society Paper Award** for his paper **An inexact feasible interior point method for linear optimization with high adaptability to quantum computers**, co-authored with his adviser, Lehigh ISE Professor Tamás Terlaky. The ICS Student Paper Award is presented annually to the best paper at the intersection of computing and operations research by a student author, as judged by an award selection committee. The runner-up awardee receives \$250.00 cash. The award was presented at the INFORMS ICS Business Meeting in Phoenix, October 15-18, 2023.



## Man Yiu (Tim) Tsang was selected for the IISE Future Faculty Fellows (3F) Program 2023-2024

Lehigh ISE is pleased to announce that PhD student **Man Yiu (Tim) Tsang** was selected for the IISE Future Faculty Fellows (3F) Program 2023-2024. Tim was nominated by his advisor, Lehigh ISE Professor Karmel S. Shehadeh, and selected from an exceptionally qualified pool of applicants to be one of 15 participants.

This year long program will educate and prepare ISE PhD students for faculty positions in academia. Through a series of virtual meetings and one-on-one meetings with a paired faculty mentor, students will learn about the academic job market, including the application, interview, and negotiation processes, professional networking and much more.

The program will commence on October 19, 2023, and conclude at the **2024 IISE Annual Conference & Expo in Montreal, Canada.**

## Adrian Harkness won second place in the Big Q Hackathon of Chicago Quantum Exchange and QuantX

Lehigh ISE is pleased to announce that PhD student, **Adrian Harkness** along with his team D2WH@ won 2nd place in the Technical Phase of the 2023 Big Q Hackathon held September 29 – October 2, 2023 in Chicago, IL. This unique event was hosted by the Chicago Quantum Exchange (CQE) and QuantX. Both CQE and QuantX work to advance the industry of quantum computing through research, information sharing, and training.

Adrian and his team members, PhD students from University of Chicago and Northwestern, worked through a real word challenge using a quantum eigenvalue solver to calculate energy levels of a molecule that they were tasked with simulating.

The prize was sponsored by Infleqtion, Quantum, and PASQAL. This event marked the first time this competition was held in the U.S. and quantum enthusiasts were excited to be part of this opportunity!



**MAN YIU (TIM) TSANG**



**ADRIAN HARKNESS**



# Lehigh ISE is Celebrating 100 years

*Please join us in celebrating Lehigh ISE 100!*

In the academic year 2024/2025 we will accomplish 100 years of Industrial Engineering at Lehigh. Yes, we started offering our first undergraduate program in Industrial Engineering a century ago! Please join us celebrating **Lehigh ISE 100**.

We are making available a number of **great sponsoring opportunities** for the many events offered on the occasion of Lehigh ISE 100. These opportunities are open to all, from members of the Lehigh ISE community (including alumni and parents of students) to industry companies interested in promoting Lehigh ISE.

You can build your name and brand awareness in our community and partnering companies, explore great

networking opportunities, and associate your name with Lehigh ISE 100 in perpetuity.

Lehigh's Industrial and Systems Engineering (ISE) Department has a world-renowned reputation of research excellence and is continually innovating in all educational, outreach, and industrial programs. We thrive as a diverse and inclusive community and provide an inspiring environment to study and discover. Our extremely successful alumni form a supportive ecosystem for extensive professional networking opportunities. Our highly ranked programs include data analytics, healthcare systems, financial engineering, and management science.

## Lehigh ISE 100 Program Events:

- Lehigh ISE Alumni Lectures, 2024
- Lehigh ISE Alumni Lectures, 2025
- Lehigh ISE Annual Banquet, 2024
- Lehigh ISE Annual Banquet, 2025
- Lehigh ISE Awards Ceremony, 2024
- Lehigh ISE Awards Ceremony, 2025
- Lehigh ISE Career Fair, 2024
- Lehigh ISE Career Fair, 2025
- Lehigh ISE First Year Student, 2024
- Lehigh ISE First Year Student, 2025
- Lehigh ISE Graduation Party, 2024
- Lehigh ISE Graduation Party, 2025
- Lehigh ISE Seminar Series, 2024
- Lehigh ISE Seminar Series, 2025
- Lehigh ISE Student Alumni Mixer, 2024
- Lehigh ISE Student Alumni Mixer, 2025
- Lehigh ISE UG and Master's Student Research Symposium, 2024
- Lehigh ISE UG and Master's Student Research Symposium, 2025
- Women at ISE, 2024
- Women at ISE, 2025
- Modeling and Optimization: Theory and Applications (MOPTA) Conference (the Lehigh ISE flagship conference), Summer 2024
- Modeling and Optimization: Theory and Applications (MOPTA) Conference (the Lehigh ISE flagship conference), Summer 2025

**DIAMOND LEVEL****\$50,000.00 (single opportunity)**

- **Naming of the whole Lehigh ISE 100 Program**
- **Verbal/slide recognition at the opening session of all Events**
- **One-time email use to address the entire Lehigh ISE alumni community**
- 125-word listing online
- Recognition on website, signage, and print of all events
- Recognition on website of the Lehigh ISE 100 Program (size proportional to sponsorship level)
- Name engraved on a plaque “Lehigh ISE 100” to be posted at Mohler 1st Floor Lounge (font size proportional to sponsorship level)

**PLATINUM LEVEL****\$25,000.00 (single opportunity)**

- **Naming of the Mobile App Lehigh ISE 100 Program**
- **Naming of 3 Events and verbal/slide recognition at the opening session of the 3 Events**
- 100-word listing online
- Recognition on website, signage, and print of 3 Events
- Recognition on website of the Lehigh ISE 100 Program (size proportional to sponsorship level)
- Name engraved on a plaque “Lehigh ISE 100” to be posted at Mohler 1st Floor Lounge (font size proportional to sponsorship level)

**GOLD LEVEL****\$10,000.00**

- **Naming of one Event and verbal/slide recognition at the opening session of the Event**
- **Co-sponsorship of the Lehigh ISE social media platforms for 2 years (Facebook, LinkedIn, twitter, Instagram)**
- 75-word listing online
- Recognition on website, signage, and print of the Event
- Recognition on website of the Lehigh ISE 100 Program (size proportional to sponsorship level)
- Name engraved on a plaque “Lehigh ISE 100” to be posted at Mohler 1st Floor Lounge (font size proportional to sponsorship level)

**SILVER LEVEL****\$2,500.00**

- 50-word listing online
- ISE Newsletter front cover co-sponsoring (3 numbers)
- Recognition on website of the Lehigh ISE 100 Program (size proportional to sponsorship level)
- Name engraved on a plaque “Lehigh ISE 100” to be posted at Mohler 1st Floor Lounge (font size proportional to sponsorship level)

**BRONZE LEVEL****\$1,000.00**

- ISE Newsletter back cover co-sponsoring (3 numbers)
- Recognition on website of the Lehigh ISE 100 Program (size proportional to sponsorship level)
- Name engraved on a plaque “Lehigh ISE 100” to be posted at Mohler 1st Floor Lounge (font size proportional to sponsorship level)

**Please contact directly Lehigh ISE Department Chair, Professor Luis Nunes Vicente ([ise@lehigh.edu](mailto:ise@lehigh.edu)).**

Luis will first address questions about the sponsorship opportunities, and then:

- (1) Call Lehigh’s Office of Development and Alumni Relations (DAR) to acknowledge your sponsorship;
- (2) Together with DAR, provide you the means to process your sponsorship;
- (3) Develop at ISE your chosen sponsorship according to the chosen level.



## A new era for the Lehigh ISE Ph.D. Program: Recent redesign creates a streamlined program for today's doctoral student

Lehigh Industrial and Systems Engineering (ISE) is excited to announce that we have recently revamped our **Ph.D. Program** for the modern doctoral student. The plan, unanimously approved by the faculty, includes streamlined sets of requirements and milestones so that students are acquiring foundational skills and conducting cutting-edge research as efficiently as possible.

In the newly revised program, all first-semester students take the program's three core courses:

- Research Methods
- Fundamentals of Optimization
- Probability and Stochastic Processes

The remaining course requirements are 6 additional elective courses, which can be completed within the first three semesters of the program and represent a meaningful reduction compared

to the previous version of the program. The department regularly offers a vibrant portfolio of courses covering all its research thrusts on mathematical optimization, stochastic models, data science and machine learning, applied operations research, quantum computing optimization, and uncertainty quantification and complex systems. These include:

- Operations Research Models and Applications
- Numerical Methods and Scientific Computing
- Optimization Under Uncertainty
- Continuous Optimization
- Discrete Optimization
- Optimization Methods for Machine Learning
- Conic Optimization
- Uncertainty Quantification
- Quantum Computing Optimization

Students are matched with a dissertation advisor within their first semester in the program. Beyond taking courses, students in the program reach significant milestones on an annual basis. After the first year, three program faculty members administer a tailored and research-focused qualifying exam that tests their ability to conduct cutting-edge research.

Around the end of their second year, each student prepares and defends a dissertation proposal to a dissertation committee, which sets the stage for the research that they will conduct for the remainder of their time in the program. Keeping in close contact with their committee through that time, within the next couple of years each student becomes an expert in their chosen field and defends their dissertation on their way to a highly successful academic or industry career!

Another exciting recent addition is our **Future Academic Career Experiential Training (FACET)** program to mentor and train our students to become academic leaders. Through FACET students meet regularly with ISE faculty members, former postdocs and former students to learn about preparing for a future career as a university faculty member. Students can acquire hands-on training through course instruction and mentorship of undergraduate and master's program students on research projects.





## A busy summer 2023 at Lehigh ISE offered two major international events: A SIAM summer school and MOPTA conference

The summer of 2023 at Lehigh ISE was full of scientific excitement! We held the 2023 edition of the prestigious annual Gene Golub SIAM Summer School and brought our flagship conference MOPTA to numbers even higher than pre-pandemic ones.

Lehigh ISE Quantum Computing and Optimization Laboratory (**QCOL**) hosted the **2023 Gene Golub SIAM Summer School on Quantum Computing and Optimization**, from July 31 to August 11, 2023. The school was co-organized by Lehigh ISE faculty Tamás Terlaky, Luis F. Zuluaga, and Xiu Yang, as well as Computer Science and Engineering faculty Arielle Carr, with support from QCOL PhD students and departmental staff. Thanks to funding from the Society for Industrial and Applied Mathematics (SIAM), the school brought together a diverse group of 42 undergraduate, master's, and PhD students from around the world to learn about fundamental and state-of-the-art results related to the use of quantum computing algorithms and devices to solve optimization and applied decision-making problems. The participants learned about this thrilling new area by both attending lectures and hands-on computing labs delivered by highly recognized researchers in the areas of quantum computing and optimization. The participants also had plenty of networking opportunities and a chance to enjoy the Musikfest Festival in Bethlehem, PA.

Lehigh ISE also hosted the 23rd edition of the **Modeling and Optimization: Theory and Applications (MOPTA 2023) Conference**, from August 16 to 18, 2023. MOPTA 2023 welcomed approximately 140 participants to Lehigh campus. The conference program consisted of 7 plenary talks from leaders in the field, 32 parallel sessions, a poster competition, and the 15th AIMMS-MOPTA Optimization Modeling Competition. The talks covered a wide spectrum of topics, ranging from data science and machine learning to quantum computing and applied operations research. In addition to the scientific program, participants had the opportunity to network and build new connections during the student social and conference banquet. MOPTA 2023 was chaired by Lehigh ISE postdoctoral researcher Tommaso Giovannelli. The optimization modeling competition was chaired by Lehigh ISE faculty Xiu Yang. MOPTA started in 2000 as a one-day workshop and has grown into an exciting three-day conference. Founded by Lehigh ISE faculty Tamás Terlaky, MOPTA has been organized and hosted by Lehigh ISE since 2009.

Lehigh ISE is proud to have hosted these two successful events which have again made us a major optimization world hub and brought life to the beautiful Lehigh picturesque campus.

## *Lehigh ISE Career Fair connects the best companies with the best students*

Lehigh ISE hosted its **annual career fair** on Wednesday, September 20, 2023 from 5:00 to 7:00 p.m. in Mohler Lab MO 355. The event was a success with a great footfall and networking between ISE students and potential employers who know the value of a Lehigh ISE degree!

Lehigh ISE is fortunate to have dedicated companies representing various industries, return each year to showcase their work and open positions. Many of the company representatives are Lehigh alum. Students appreciate the smaller sized venue and opportunities for one-on-one conversations where they can apply their professional skills in a comfortable environment.

In addition to our external recruiters, Lehigh ISE Faculty, Professor **Ana Alexandrescu**, Director of Healthcare Systems Engineering Master's Program, along with Professor **Daniel P. Robinson**, Director of ISE and MGSE Master's Program were in attendance to answer questions from UG students interested in these master's programs.

ISE Senior Brook Cannon, one of the key organizers of the new IISE Student Chapter shared information about the new chapter with prospective members.

The event was organized by Lehigh ISE Master Student **Hiral Patel**, and ISE Staff, Sheila Dorney, Joyce Gabay, and Mark Mostko. We are also grateful to our student helpers Zining, Brendan, Eric, and Max.



INDUSTRIAL AND SYSTEMS  
ENGINEERING

**ISE CAREER FAIR 2023**

• DISCOVER • NETWORK • EXPLORE

**WEDNESDAY, 20 SEPTEMBER 2023**  
**5:00- 7:00 PM**  
**MO 355, DEPARTMENT OF INDUSTRIAL  
AND SYSTEMS ENGINEERING**

**COMPANIES IN ATTENDANCE**

**LUTRON** **GORE** **AXTRIA**  
HEALTHCARE SYSTEMS ENGINEERING

**B|BRAUN** **AIR PRODUCTS**  
SHARING EXPERTISE

**AND MANY MORE....**

SPENCER C. SCHANTZ

*lecture series*

*Anna Grassellino, Senior Scientist at Fermilab and Director of the SQMS Center, gave a Spencer C. Schantz Distinguished Public Lecture*

ANNA GRASSELLINO

The Lehigh ISE Department and Quantum Computing Optimization Lab were pleased to announce that **Anna Grassellino**, Senior Scientist, Fermilab; Director of the National Quantum Information Science SQMS Center, gave the Spencer C. Schantz Distinguished Lecture "Enabling Scientific Discovery in Quantum Information Science at the Superconducting Quantum Materials and Systems (SQMS) Center", on Monday, July 31, 2023, from 10:00 a.m. to 11:00 p.m. in STEPS #101, 1 W. Packer Avenue, Bethlehem PA 18015.

Dr. Grassellino was a keynote speaker of the **2023 Gene Golub SIAM Summer School on Quantum Computing and Optimization** which was held in ISE's Mohler Lab, Lehigh University, July 31 to August 11, 2023.

**Abstract:**

In this talk I will describe the mission, goals and the partnership strengths of the DOE National Quantum Information Science Research Center SQMS. SQMS brings the power of national laboratories, together with industry, academia and other federal entities, to achieve transformational advances in the major cross-cutting challenge of understanding and eliminating the decoherence mechanisms in superconducting 2D and 3D devices, with the final goal of enabling construction and deployment of superior quantum systems for computing and sensing. SQMS combines the strengths of an array of experts and world-class facilities towards these common goals. Materials science experts work in understanding and mitigating the key limiting mechanisms of coherence in the quantum regime. Coherence time is the limit on how long a qubit can retain its quantum state before that state is ruined by noise. It is critical to advancing quantum computing, sensing and communication. SQMS is leading the way in extending coherence time of superconducting quantum systems thanks to world-class materials science and through the world leading expertise in superconducting RF cavities which are integrated with industry-designed and -fabricated computer chips. Leveraging new understanding from the materials development, quantum device and quantum computing researchers will pursue device integration and



quantum controls development for 2-D and 3-D superconducting architectures. One of the ambitious goals of SQMS is to build and deploy a beyond-state-of-the-art quantum computer based on superconducting technologies. Its unique high connectivity will provide unprecedented opportunity to explore novel quantum algorithms. SQMS researchers will ultimately build quantum computer prototypes based on 2-D and 3-D architectures, enabling new quantum simulation for science applications. We also employ quantum sensors for several experiments searching for dark matter, gravitational waves and fundamental tests of quantum mechanics.

**Bio:**

Anna Grassellino is the Director of the National Quantum Information Science SQMS Center, a Fermilab Senior Scientist and the head of the Fermilab SQMS division. Her research focuses on radio frequency superconductivity, in particular on understanding and improving SRF cavities performance to enable new applications, spanning from particle accelerators to detectors to quantum information science.

Grassellino is a fellow of the American Physical Society and the recipient of numerous awards for her pioneering contributions to SRF technology, including the 2017 Presidential Early Career Award, the 2017 Frank Sacherer Prize of the European Physical Society, the 2016 IEEE PAST Award, the 2016 USPAS prize, a DOE Early Career Award and the New Horizons in Physics Prize by the Breakthrough Foundation. She holds a Ph.D. in physics from the University of Pennsylvania and a master's of electronic engineering from the University of Pisa, Italy.

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**Lehigh ISE Spencer C. Schantz Distinguished Lecture Series:**

The lecture series is endowed in the name of the late Spencer C. Schantz, who graduated from Lehigh in 1955 with a B.S. in Industrial Engineering. Following progressive responsibilities with several electrical manufacturing companies, in 1969 he founded U.S. Controls Corporation and became its first CEO and President. The Spencer C. Schantz Distinguished Lecture Series was established by his wife Jerelyn as a valuable educational experience for faculty, students and friends of Lehigh's Industrial and Systems Engineering department.

SPENCER C. SCHANTZ

*lecture series*

JULIE S. IVY

*Julie S. Ivy, Department Chair at NCSU ISE, gave an ISE-COH-HSE Spencer C. Schantz Distinguished Public Lecture*

The Lehigh ISE Department was pleased to announce that Professor **Julie S. Ivy** from the Edward P. Fitts Department of Industrial and Systems Engineering and Fitts Faculty Fellow in Health Systems Engineering, North Carolina State University gave the Spencer C. Schantz Distinguished Lecture titled Learning from Data for Decision Making in Health and Humanitarian Logistics: Insights and Challenges in a World with Increasing AI, on Friday, August 18 2023, from 2:00 p.m. to 3:30 p.m. in Rauch Business Center RB 184 (Perella Auditorium).

**Abstract:**

Decision making to satisfy the basic human needs of health, food, and education is complex. We present an overview of two illustrative studies using data to inform decision making in health care delivery associated with sepsis and hunger relief.

In the first study, we integrate electronic health record (EHR) data with clinical expertise to develop a continuous-time Markov decision process model of the natural history of sepsis. We use this model to better understand the stochastic nature of patients' health trajectories and determine the optimal treatment policy to minimize mortality and morbidity. Specifically, the optimal health states for first anti-infective and first fluid are identified. We formulate this as a stopping problem in which the patient leaves the system when he or she receives the first treatment (intervention) and receives a lump sum reward. Our objective is to find the optimal first intervention for health states to minimize expected mortality and morbidity. We explore the effect of the complex trade-offs associated with the intervention costs and patient disposition costs which are subjective and difficult to estimate. Our model captures the natural progression along sepsis trajectory using a clinically defined treatment delayed population. The model translates observations of patient health as defined by vitals and laboratory results recorded during hospitalization in the EHR to capture the complex evolution of sepsis within a patient population. This framework provides key insights into sepsis patients' stochastic trajectories and informs clinical decision making associated with caring for these patients as their health dynamically evolves.

In the second study, in collaboration with our food bank partner in North Carolina, we develop a single-period, weighted multi-criteria optimization model that provides the decision-maker the flexibility to capture their preferences over the three criteria of equity, effectiveness, and efficiency, and explore the resulting trade-offs. Food banks are challenged with juggling multiple criteria such as equity, effectiveness, and efficiency when making distribution decisions. Models that assume predetermined weights on multiple criteria may produce inaccurate results as the preference of food banks over these criteria may vary over time, and as a function of supply and demand. We introduce a novel algorithm to elicit the inherent preference of a food bank by analyzing its actions within a single-period. The algorithm does not require direct interaction with the decision-maker. The non-interactive nature of this algorithm is especially significant for humanitarian organizations such as food banks which lack the resources to interact with modelers on a regular basis. We explore the implications of different decision-maker preferences for the criteria on distribution policies.

**Bio:**

Julie Simmons Ivy is a professor in the Edward P. Fitts Department of Industrial and Systems Engineering and Fitts Faculty Fellow in Health Systems Engineering. She previously spent several years on the faculty of the Stephen M. Ross School of Business at the University of Michigan. She received her B.S. and Ph.D. in Industrial and Operations Engineering at the University of Michigan. She also received her M.S. in Industrial and Systems Engineering with a focus on Operations Research at Georgia Tech. She is a President of the Health Systems Engineering Alliance (HSEA) Board of Directors. She is an active member of the Institute of Operations Research and Management Science (INFORMS), Dr. Ivy served as the 2007 Chair (President) of the INFORMS Health Applications Society and the 2012 – 13 President for the INFORMS Minority Issues Forum. Her research interests are mathematical modeling of stochastic dynamic systems with an emphasis on statistics and decision analysis as applied to health care, public health, and humanitarian logistics. This research has made an impact on how researchers and practitioners address complex societal issues, such as health disparities, public health preparedness, hunger relief, student performance, and personalized medical decision-making and has been funded by CDC, NSF, Clinton Health Access Initiative, and the UNC Cancer Center.

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WSJ | JOURNAL REPORTS

## 2024 Best Colleges in the U.S.

A new Wall Street Journal/College Pulse ranking of top colleges offers an outcomes-focused methodology—and a lot of surprises



## *Lehigh University ranks in the top 20 universities in the country!*

The 2024 edition of the newest The Wall Street Journal / College Pulse Best Colleges in the U.S. ranks Lehigh University #14 out of 400 universities in the country.

The methodology used criteria with an increased importance of student outcomes like graduation rates, graduate salaries, and learning environment and uses the most recent data to determine the rankings. These rankings highlight how much a college boosts its students' chances of graduating on time and how much it increases the salaries after graduation.



## *DEGREES AWARDED SUMMER 2023*

### **M.ENG. HEALTHCARE SYSTEMS ENGINEERING**

- Farrah Elhefnawy
- Bridget Walicki

### **M.ENG. MANAGEMENT SCIENCE AND ENGINEERING**

- Matthew Harrison

### **B.S. INTEGRATED BUSINESS AND ENGINEERING HONORS PROGRAM (ISE MAJOR)**

- Victoria Collum

### **B.S. INTEGRATED BUSINESS AND ENGINEERING HONORS PROGRAM (FINANCIAL ENGINEERING MAJOR)**

- Sammy Powers

### **B.S. INDUSTRIAL AND SYSTEMS ENGINEERING**

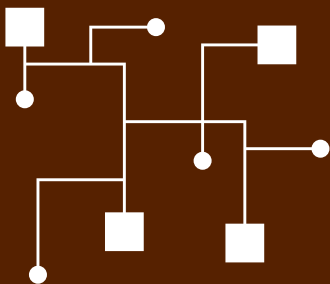
- Trevor Belinsky
- Gabrielle Effendi
- Victoria Collum
- Liz Newport



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