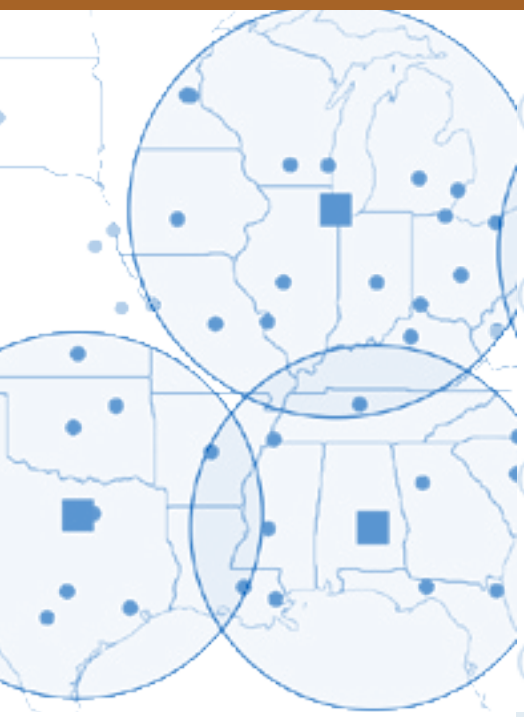
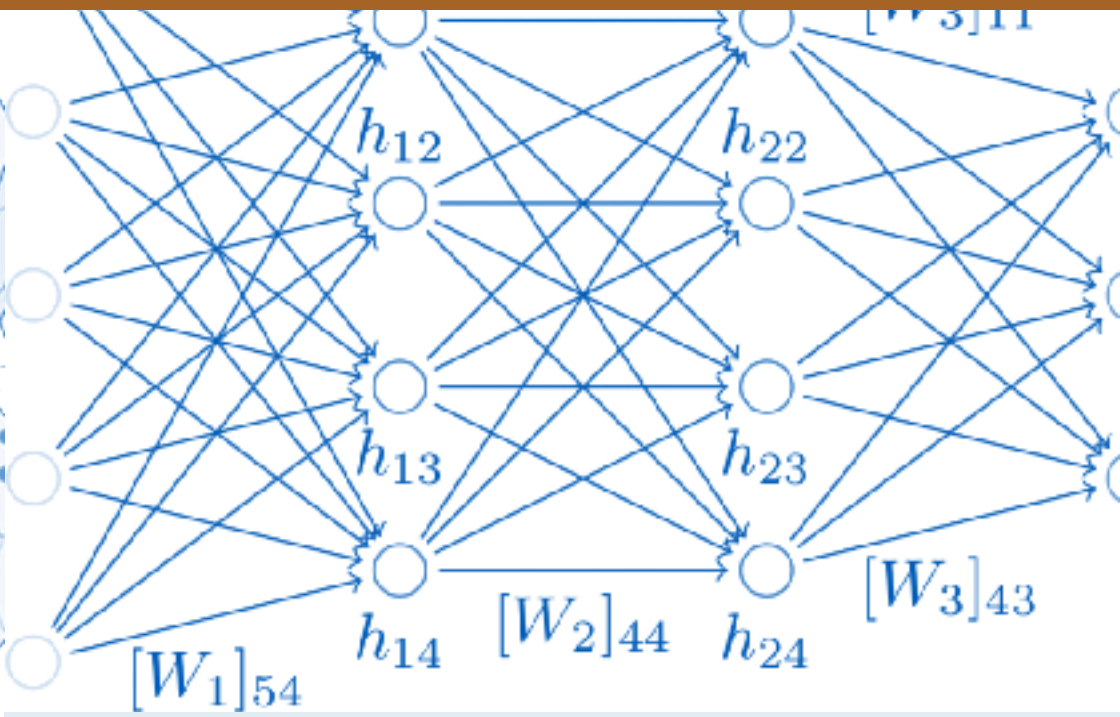
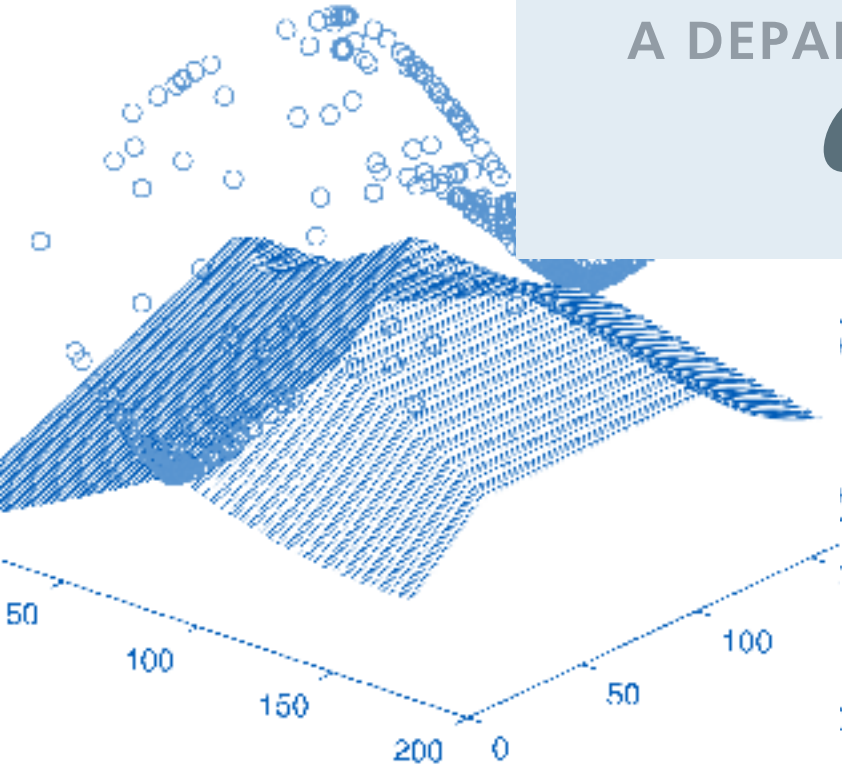
INDUSTRIAL AND SYSTEMS ENGINEERING

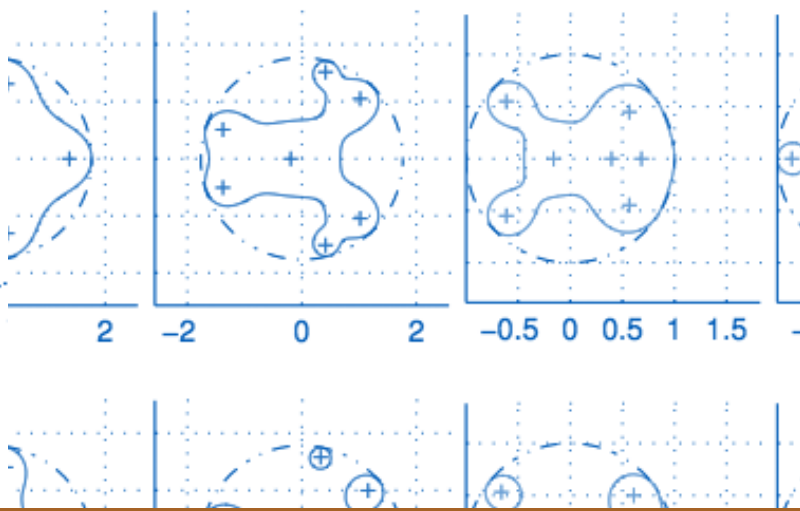
NEWSLETTER 2018



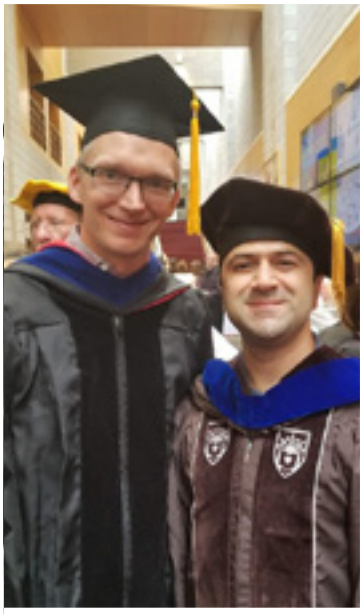


A DEPARTMENT OF *excellence*





LEHIGH UNIVERSITY | P.C. Rossin College of Engineering and Applied Science



A few Class of 2018 ISE students pose for the camera after their walking ceremony.

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ISE DEPARTMENT NEWSLETTER FALL 2018

ISE DEPARTMENT CHAIR
Dr. Luis Nunes Vicente

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Dr. George Wilson

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Alison O'Connell

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Reader Feedback:
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Alison O'Connell at alo209@lehigh.edu

DEAR FRIENDS,

It is certainly too early to report as a chair here in our Newsletter as my term has only started a couple of months ago, August 1, 2018, to be more precise. Instead, I invite you to read the welcome note that was recently posted on our website.

However, before that, I would like to thank all ISE Faculty and Staff for their support and encouraging, in particular Tamás and Ted, as previous chairs, and Kathy and Ana in our office. I have been very fortunate to count on their kindness and generosity.

This Newsletter edition is late --- I know and apologize. Abby left us in June and we are greatly indebted to her for many years of dedication and professionalism. We have just hired Alison as our new Marketing and Events Specialist, who started working with us October 1. Alison is already editing this Newsletter!

It is now time to leave you with my website note.

Warmest regards,
LUIS

CHAIR'S MESSAGE

Industrial and systems engineering is a fantastic branch of engineering which deals with the optimization of complex processes, systems, networks, investments or organizations. We develop, improve, and implement integrated systems and our goals may involve cost or profit, material, productivity, energy, time or other key resources.

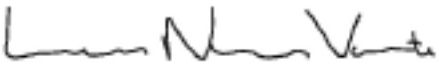
Our field is naturally multidisciplinary and we learn and master the fundamental principles of various disciplines such as modern manufacturing and automation, computing and information systems, algorithms and simulation, data science, decision and game theories, statistics and queuing theory, mathematical optimization, and operations research and management sciences (from supply chain, facility layout, and transportation to healthcare and finance). Our field is also interdisciplinary in the sense that ISE is indeed a new synthesis! We are in a unique position to excel in a world where resources are scarce, competition is ubiquitous, and risk is a permanent concern.

Lehigh's ISE Department has a worldwide reputation and a long tradition in industrial engineering. A department that has been constantly adapting to the high-tech data revolution of our current days. A department that has a small student-to-faculty ratio, and provides an inspiring environment to study and discover.
Our B.S. and M.S. programs are among the very best in the country. Here we form professionals with a solid knowledge and understanding of the industry needs, but who are simultaneously problem solvers and critical thinkers. A great number of our alumni have become leaders in their fields of operation.

We do cutting-edge research in Mathematical Optimization, Data Science and Machine Learning, Energy and Service Systems, and High-Performance Computing. Our Ph.D. program is vibrant and highly selective and has been providing financial support for incoming students and offering great job opportunities to those who have completed it, both in academia and in the industry.

I invite you to visit us on campus or browse our website where you can find information about our degrees, faculty, dedicated programs and centers, computing resources, and laboratories.

Regards,



LUIS NUNES VICENTE

ISE FACULTY & STAFF *update*

XIU YANG

We are pleased to announce that Xiu Yang will be a new faculty member joining our department and will begin in Fall 2019.

Xiu Yang has been a scientist at Pacific Northwest National Laboratory (PNNL) since 2016. His research is focused on modern scientific computing including uncertainty quantification, multi-scale modeling, physics-informed machine learning, and large scale model calibration. Xiu has been applying his methods on various research areas such as fluid dynamics, hydrology, biochemistry, soft material, climate modeling, energy storage, and power grid system. He received the Outstanding Performance Award from PNNL in 2015 and 2016, and has served as a poster judge for SIAM CSE meeting.

Xiu obtained his Ph.D. in the Division of Applied Mathematics at Brown University. He received his B.S. and M.S. from the Department of Scientific and Engineering Computing at Peking University, China. Xiu was a visiting graduate student at the Center of Turbulence Research at Stanford University in 2012.

ALBERT S. BERAHAS

Albert S. Berahas joined the Industrial and Systems Engineering Department at Lehigh University as a Postdoctoral Research Fellow in September 2018. He is currently working with Professors Katya Scheinberg, Frank Curtis, and Martin Takáč. Prior to this appointment, he was a Postdoctoral Research Fellow in the Industrial Engineering and Management Sciences Department at Northwestern University. Albert obtained his Ph.D. in Engineering Sciences and Applied Mathematics (ESAM) at Northwestern University in 2018. He received his undergraduate degree in Operations Research and Industrial Engineering from Cornell University in 2009, and his M.S. in Applied Mathematics in 2012 from Northwestern University. Berahas has received the ESAM Outstanding Teaching Assistant Award, the Walter P. Murphy Fellowship, and the John N. Nicholson Fellowship. Berahas' research interests include optimization algorithms for machine learning, convex optimization and analysis, derivative-free optimization, and distributed optimization.

LUIS NUNES VICENTE

Luis Nunes Vicente has been named the Timothy J. Wilmott '80 Endowed Faculty Professor and Chair of Lehigh University's Department of Industrial and Systems Engineering (ISE) and began his term on August 1, 2018.

Luis has been a professor of Mathematics at the University of Coimbra in Portugal since 1996. His research interests include continuous optimization, computational science and engineering, machine learning and data science.

Along with Lehigh's Katya Scheinberg and Andrew R. Conn from IBM Research, Luis received the prestigious Lagrange Prize in Continuous Optimization, awarded jointly by the Mathematical Optimization Society (MOS) and the Society for Industrial and Applied Mathematics (SIAM), for co-authoring the book *Introduction to Derivative-Free Optimization*. He has also published more than 100 papers, given a number of plenary lectures in distinguished societies around the world, and served on numerous editorial boards including *MOS-SIAM Series on Optimization, EURO Journal on Computational Optimization,* and *Optimization Methods and Software*. He has served as editor-in-chief of Portugaliae Mathematica, published by the European Mathematical Society, and as associate editor for the SIAM Journal on Optimization.

Luis obtained his doctorate in Computational and Applied Mathematics from Rice University in 1996 as a Fulbright Fellow. He held visiting positions at the IBM T.J. Watson Research Center and the IMA/University of Minnesota in 2002-2003, the Courant Institute of Mathematical Sciences at NYU, the Université Paul Verlaine of Metz in 2009-2010, and Sapienza University of Rome and Rice University in 2016-2017. He served as a visiting *Chercheur Sénior* of the Fondation de Coopération Sciences et Technologies pour l'Aéronautique et l'Espace at CERFACS and Institut National Polytechnique in Toulouse, France in 2010-2015. He has supervised six postdocs, 10 doctoral students and 12 masters' students.

In his spare time, Luis enjoys watching movies and learning languages. A Portuguese citizen, he reports that he has learned to speak some Spanish, speaks French fluently, and is currently refining his Italian.

ALISON O'CONNELL

Alison O'Connell is the new Marketing and Events Specialist for the ISE Department. Her previous position was as Development Manager for ProJeCt of Easton. She is a SouthSide Bethlehem resident and proud Lehigh graduate. She obtained her B.A. in 2009 and M.A. in 2012 from Lehigh, both in History. She was interested in joining Lehigh University because of her wonderful previous experience, and is thrilled to be joining a department as well-respected and highly-ranked as ISE. She enjoys yoga, movies, and giving back to her community, and looks forward to sharing ISE's many successes with the public.

2018 ISE DISTINGUISHED ALUMNI AWARDS

We presented the **2018 ISE Distinguished Alumni Award in Academia** to Mikell P. Groover at our annual banquet on May 3, 2018. Dr. Groover is Professor Emeritus of Industrial and Systems Engineering at Lehigh, and holds four degrees from the university: B.A., B.S.ME, M.S.IE, and Ph.D. While a member of the faculty at Lehigh, Dr. Groover was principal investigator and contract administrator for research contracts sponsored by the National Science Foundation and other national and state agencies, as well as several industrial corporations. He retired from Lehigh in 2010 after more than 45 years of teaching and research.

The ISE Department was honored to have Dr. Groover also give the **2018 Spencer C. Schantz Lecture** entitled, *"The Evolution of Lehigh University's Industrial and Systems Engineering Department"*. His presentation highlighted some of the milestones in the early history of the department and the faculty and staff who contributed to its success. The important historical events included the introduction of the IE program in 1925, the formation of the department in 1949, and the evolution of the curriculum over the years.

We also presented the **2018 ISE Distinguished Alumni Award For Excellence in Industry** to Lawrence E. White. Larry graduated from Lehigh three times: with a B.S. Electrical Engineering in 1964, an M.S. in Management Science in 1965, and a Ph.D. in Industrial Engineering / Information Systems in 1969. His Ph.D. degree was one of the first ever given by Lehigh in Industrial Engineering.

Larry's work experience has included business consulting, multifamily real estate development, and the establishment of several insurance companies. In 2004, he created an endowment to perpetually fund the salary of the Lawrence E. White Head Coach of Wrestling at Lehigh, initially Greg Strobel and currently Pat Santoro. In 2016, he also initiated the Lawrence White Fellowship for Management Science and Engineering. He expects to continue the fellowship indefinitely.

The ISE Distinguished Alumni Award is presented to graduates of the department who have distinguished themselves professionally, made significant contributions to society, and through their achievements, have reflected credit on Lehigh University. Recipients are selected by members of the ISE faculty and the department's Advisory Council.

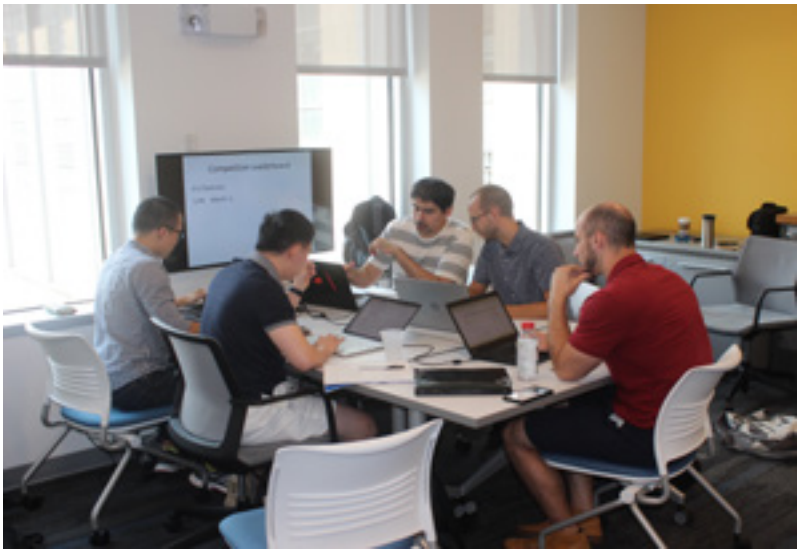
MOPTA

The Modeling and Optimization: Theory and Applications (MOPTA) conference is an annual event organized by ISE at Lehigh aiming to bring together a diverse group of researchers from around the globe from both discrete and continuous optimization, working on both theoretical and applied aspects. The conference consisted of invited talks from distinguished speakers and selected contributed talks, spread over three days. This year's event was extra special, because it was combined with an NSF-TRIPODS sponsored three day summer school for doctoral students, held on August 10-12 and the NSF-DIMACS sponsored workshop on Optimization in Machine Learning, which is a part of the DIMACS/Simons Collaboration on Bridging Continuous and Discrete Optimization and which took place on August 13-15. The MOPTA part of the conference (August 15-17) included a variety of exciting new developments from different optimization areas and a special focus stream on optimization in energy. The conference brought together researchers from both theoretical and applied communities for lively and invigorating interactions.

The TRIPODS/DIMACS sponsored workshop and summer school on Optimization in Machine Learning was partially funded under the National Science Foundation award "RCN: DIMACS/Simons Collaboration on Bridging Continuous and Discrete Optimization" which assembled around 35 very highly recognized speakers and more than 80 participants. In addition, there was a poster session during which 19 students and young researchers presented their work.

The summer school was held August 10-12, 2018, prior to the MOPTA conference. More than 40 students from universities in the United States and abroad came to Lehigh to learn about machine learning, deep learning, mathematical optimization, and how to solve data-driven problems using Python and PyTorch. The school was taught by members of the TRIPODS team: Frank Curtis, Martin Takáč, both of Lehigh, and Francesco Orabona of Boston University. The students enjoyed intensive theoretical and practical training by day, and the local Bethlehem scene by night. The school ended with a friendly but vigorous team competition.

Following the three-day summer school, ISE hosted a DIMACS workshop on Optimization and Machine Learning that attracted some of the top international scholars on the subject. The workshop explored types of structure that aid optimization and their potential impact on machine learning problems. Topics included geometric optimization, polynomial optimization, relaxations, restricted and generalized versions of convexity, and blending of discrete and continuous optimization. The workshop featured plenary talks from Peter Bartlett from UC Berkeley, who spoke on *"Representation, optimization and generalization properties*



of deep neural networks", John Duchi of Stanford, who spoke on *"Better models in optimization"*, Suvrit Sra from MIT, who spoke on *"Tractable nonconvex optimization via geometry"*, Kilian Weinberger of Cornell, who spoke on *"Deep Learning with Dense Connectivity"*, and Stephen Wright from the University of Wisconsin-Madison, who spoke on *"Practical Conditional Gradient Algorithms"*.

The events were a great success and the organizing committee has received many compliments on the high quality of the content, the beautiful and comfortable setting of the Iaccoca Conference Center, and Lehigh's hospitality.

The MOPTA conference in addition featured plenary talks by Andrea Lodi, who gave a talk *"On big data, optimization and learning"*, David Morton, who spoke on "*Optimizing Prioritized and Nested Solutions"*, and two leading researchers on optimization in energy - Daniel Bienstock, whose talk was titled *"Variability-aware power operations"*, and Marija Ilic, who spoke on *"New Energy Space Modeling and Implications on Complexity of Decision Making and Control"*.

This year also marked the 10th annual AIMMS-MOPTA Optimization Modeling competition, which had a record number of participants. The goal of this year's competition was to create a vehicle routing schedule to deliver perishable goods to multiple locations. There were three finalist teams who gave presentations at the conference, after which the judges - Tamás Terlaky, Boris Defourny, and Martin Takáč (Lehigh University), and Deanne Zhang (AIMMS) - ranked the teams based on a combined score for their model, implementation, report, solution, oral presentation, and answers to the judges' questions. The judges awarded the first prize to team "Opti Mice" at the MOPTA conference banquet.

Team Opti Mice consisted of Nicolás Cabrera, Daniel Cifuentes, and Sebastián Cardona, from Universidad de los Andes, Colombia. They used statistical analysis to estimate the stochastic parameters, optimization modeling for the truck routes, and simulation to verify the results. For the optimization modeling part, they implemented a column generation approach, by using the AIMMS GMP library, to generate valid routes.

Second place was awarded to Team ZIB, consisting of Mats Olthoff and Stanley Schade from Zuse Institute Berlin. They built an effective routing model containing vehicle tour assignment and path tour assignment.

Third place was granted to Team Sparkles, consisting of Srinivasan Balan, Rahman Khorramfar, and Rakesh Pandian Thangaraju from North Carolina State University. They used a two-phase approach to assign tours and trucks.

TAMÁS TERLAKY, George N. and Soteria Kledaras '87 Endowed Chair Professor, had a busy year with many accomplishments.

During his one semester academic leave in 2018, Tamás traveled the world for conferences, visits, plenary lectures, and keynote presentations. In April 2018, he accepted the *INFORMS Daniel H. Wagner Prize for Excellence in Operations Research Practice* at the annual Edelman Gala of INFORMS (The Institute for Operations Research and the Management Sciences). The prize was awarded for his work *"The Inmate Assignment and Scheduling Problem and its Application in the PA Department of Corrections"*, along with Mohammad Shahabsafa, Chaitanya Gudapati, Anshul Sharma, George R. Wilson, and Louis J. Plebani (all of Lehigh University), and Kristofer B. Bucklen of the Pennsylvania Department of Corrections.

Additionally, Tamás was elected as a Fellow of the Society for Industrial and Applied Mathematics (SIAM). He was recognized for his fundamental contributions to the theory and practice of optimization and exemplary service to the optimization community, and attended the SIAM Fellow Induction at the SIAM Annual Meeting in Portland, OR on June 9, 2018. *"It is heartwarming to see my friends and colleagues take the time and effort to nominate me for such a great recognition, and for SIAM to value my contributions,"* Tamás said. *"Membership in the distinguished club of SIAM fellows comes with accolades but also the duty to humbly serve our community."* He also serves as chair of the SIAM Activity Group on Optimization.

Tamás was also recognized as a Distinguished Visiting Professor at Pannon University in Veszprém, Hungary, where he will be a professor of operations research from 2018-2023. He attended an induction ceremony on September 11, 2018.

In October 2018 Tamás was elected as Vice President - Meetings of INFORMS. In this function he serves on the INFORMS Board, chairs its Meetings Committee, which oversees policy and proposes strategic direction for INFORMS meetings, and, together with the Meetings Department of INFORMS, oversees the scheduling, contracting, and administration of the meetings of INFORMS. Tamás has an extensive history of engagement with INFORMS. He is a Fellow of INFORMS, he served as General Chair of the 2015 Annual Conference in Philadelphia, and has also served as Chair of INFORMS' Optimization Society.

KATYA SCHEINBERG has been appointed as a co-director of the Lehigh Interdisciplinary Institute for Data, Intelligent Systems & Computation (I-DISC). In September 2018, she was one of six speakers at the inaugural Princeton Day of Optimization. In addition, Katya has been appointed as the Editor-in-Chief of Mathematics of Operations Research, a journal published by INFORMS. Her term starts in January 2019.

LAWRENCE SNYDER, along with a team including Martin Takáč and two Ph.D. students, Afshin Oroojlooy and Reza Nazari, have been working on a machine learning algorithm for the "beer game", a classic in-class supply chain game. They have also worked with Opex Analytics, a company in Chicago, to create an online version of the beer game, which is free and easy to use, and which implements their machine learning algorithm so that you can play the game with, or against, an "AI agent". You can learn more at https://beergame.opexanalytics.com/.

GEORGE WILSON and **LOUIS PLEBANI** were awarded the *INFORMS Daniel H. Wagner Prize for Excellence in Operations Research Practice* for their work "*The Inmate Assignment and Scheduling Problem and its Application in the PA Department of Corrections*", along with Tamás Terlaky, Mohammad Shahabsafa, Chaitanya Gudapati (all of Lehigh University), and Kristofer B. Bucklen of the Pennsylvania Department of Corrections.

MARTIN TAKÁČ and **TAMÁS TERLAKY** edited a volume containing a selection of contributions that were presented at the Modeling and Optimization: Theory and Applications Conference (MOPTA) held on August 17-19, 2016.

EMORY ZIMMERS received the *"Award for Student Club/Organization Advisor of the Year"* in May 2018 for his work with the National Society of Leadership and Success. The award recognizes an advisor who has made a significant contribution to the student organization with which he or she works.

research grants

Katya Scheinberg, PI

- *"The DISC Institute Workshop Series on Machine Learning + X"*, National Science Foundation (NSF), $200,000, September 2018-August 2021. This grant will allow Lehigh to hold several high profile workshops on the topics related to applications of machine learning to various applied domains.
- *"Novel Methods for Stochastic Data-Driven Nonconvex Optimization"*, DARPA-Lagrange, $250,000, April 2018-September 2019.
- Google Research Award, $56,000. This award will be used to work on black-box optimization in reinforcement learning and robotics.

Katya Scheinberg (PI), Frank Curtis (Co-PI), Martin Takáč (Co-PI)

- *"Collaborative Research: TRIPODS Institute for Optimization and Learning"*, NSF, $400,000, January 2018-December 2020. Phase I of this project is the creation of an institute to bridge the gaps between applied mathematicians, computer scientists, and statisticians working on data science problems.

Bob Storer (PI), Larry Snyder (Co-PI), and Luis Zuluaga (Co-PI)

- *"Optimization Algorithms for Layout of Ammunition Support Activities"*, Army Logistics Research and Engineering Directorate,

  $262,337. The objective of the proposed research is to develop a methodology that would automate the layout of all facilities within an ASA based on optimization criteria including minimizing land requirements, minimizing risk, and minimizing stock retrieval times.

Luis Zuluaga (PI) and Bob Storer (Co-PI)

- *"Replenishment decisions based on customer needs and supply chain performance"*, Pennsylvania Infrastructure Technology Alliance (PITA), amount?, January 2018-June 2019. In collaboration with Camilo Mancilla from Johnson & Johnson, this project will look at how to better make business decisions related to the supply chain management of intraocular lens intended for eye surgeons.

Martin Takáč, Co-PI

- *"Uncertainty Quantification and Reduction in Digital Image Correlation for Deep Learning Damage Diagnostic"*, Pennsylvania Infrastructure Technology Alliance (PITA), $28,875, January 2018-June 2019. The objective of this project is to develop a deep learning platform to analyze the temporally and spatially dense data collected from Digital Image Correlation (DIC) towards condition assessment and monitoring of the structural systems.

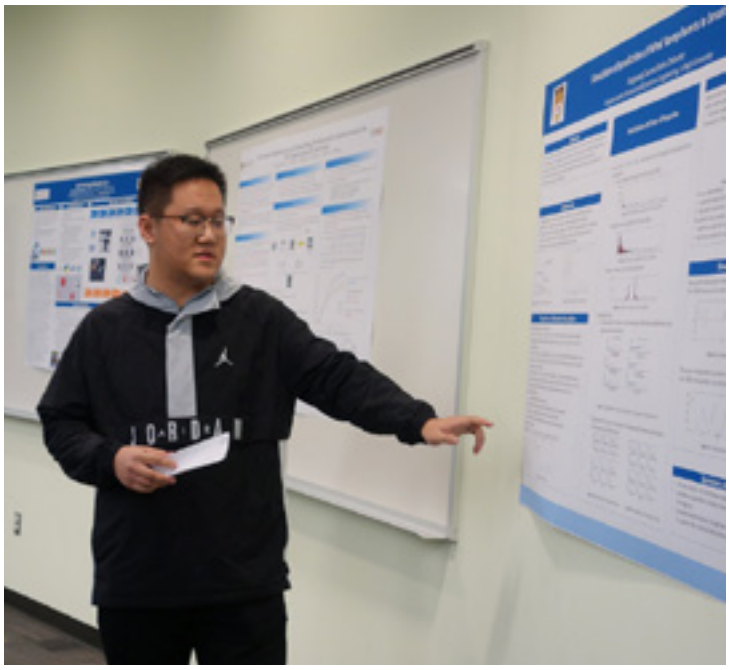
2018 ISE UNDERGRADUATE & MASTER'S RESEARCH SYMPOSIUM

Three undergraduate students won first place at the ISE Undergraduate & Master's Research Symposium on February 1, 2018. The competition, organized by Martin Takáč, was open to all ISE undergraduate and masters students and highlighted both the opportunities and resources available for all students.

Jack Circus, Logan Herr and Sam Presti's first place project was *"Self Driving Robotic Car"*. Judy Lu won second place for *"Facial Emotions Recognition"*.

In the Master's competition, Anshul Sharma won first place for *"The Inmate Assignment and Scheduling Problem and its Application in the PA Department of Corrections"*. Sweta Korat won second place for *"Optimizing Laboratory TAT for ED STAT Orders"*.

Circus, Herr and Presti went on to present their work at the David and Lorraine Freed Undergraduate Research Symposium on March 22.



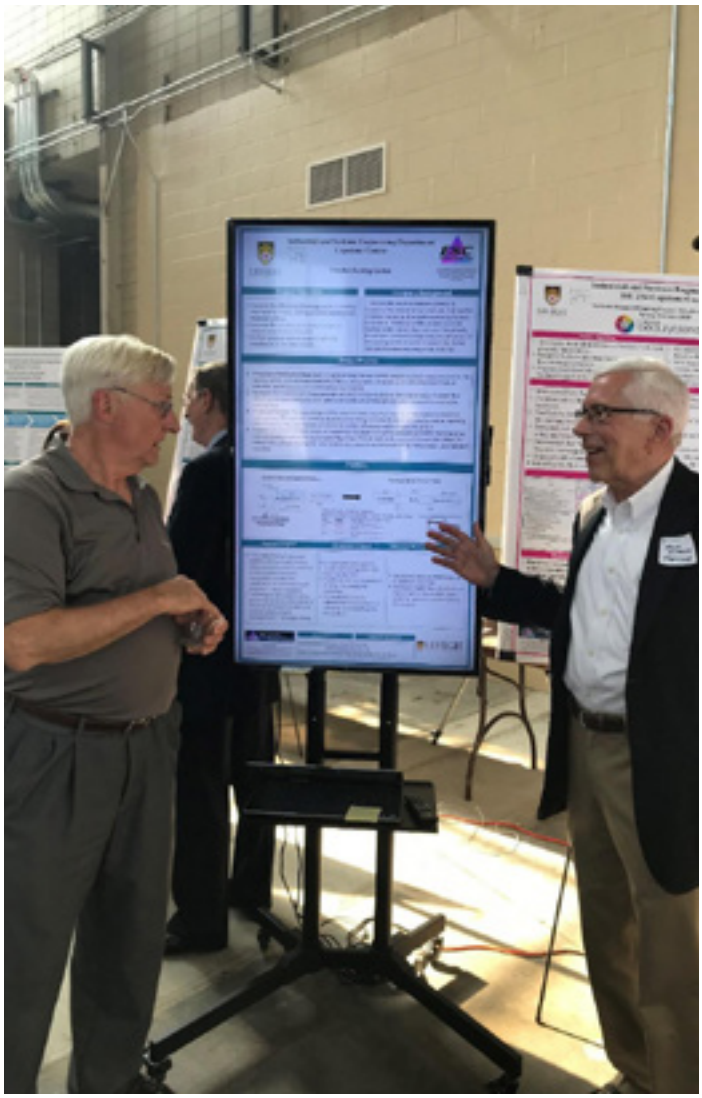
Enterprise Systems Center

Student Participation in Enterprise Systems Center Company Projects Continues to Increase and Culminates in Participation in the First Annual College Expo

In the 2017-2018 academic year, 119 students participated in more than 50 company projects with the Enterprise Systems Center (ESC). 68 students were part of the ISE 254 Capstone Course, and for the 2018 spring semester, nearly all of the Capstone Course students enthusiastically participated in the First Annual College Expo. This event highlighted Capstone Course successes from all of the Engineering College departments. The featured pictures show some of the student participants along with Dean Stephen DeWeerth and Dr. Emory Zimmers, who is the Professor of the ISE 254 Capstone Course and Director of the ESC.

In 2018, the Enterprise Systems Center's operational philosophy included techniques gained from affiliation with various technical societies as well as working within the ISE Department to improve experiential-learning methodologies. This approach has continued to be utilized with a qualified group of experienced consultants, mentors, industry partners, and a lecture structure which receives very positive reviews and evaluations.

The continuous improvement will continue to benefit from input from alumni working for major employers of our graduates as well as long-term forecasts of employment needs. The ESC has continued its efforts to incorporate state-of-the-art industrial engineering techniques in the analysis and design portion of the Capstone Course. Emphasis has been placed on students utilizing appropriate design methods and their thorough explanation in project execution, including formal reports and presentations.



Healthcare Systems Engineering 2018 Graduates

SWETA KORAT '18
B. Braun
Corporate Trainee

YANGLI XIONG '18
UNC Healthcare
Quality and Organizational Excellence Leader

DEVIKA GUPTA '18
PCOM
Medical Student

PAUL ASADOURIAN '18
Columbia University
Medical Student

DANIELLE MUSTIN '18
Emory University
Medical Student

XIANDONG PENG '18
KMK Consulting
Analyst

ZARA AHMAD '18
PwC
Management Consultant

YASHODAHN WAGH '18
KMK Consulting
Analyst

JADON SARGEANT '18
Suvoda
Associate Project Manager

SCOTT GRANT '18
Merck
Associate Specialist, Engineering

NICHOLAS GLASS-HARDENBERG '18
IBM
Consultant

NATHAN MORRISON '18
PCOM
Medical Student

ROBERT STORER '18
Penn State Health Milton S. Hershey Medical Center

CAITLIN FODOR '18
St. Luke's University Health Network
Management Engineer

DANIEL HAIGHT '18
United Healthcare Group
Process Optimization

DAN PAEZ '18
Hackensack Meridian Health
Quality Analytics Specialist

MATTHEW CHRISTMAN, MD '18
Naval Medical Center
Pediatric Urologist

CONGRATULATIONS
HSE graduate Lori Alfonse has been promoted to Deputy Physician in Chief of the Lehigh Valley Cancer Institute. In her own words, "I am thrilled and honored to assume this new role and would not be here without the education and experience I have gained during my Master's Program in HSE". We wish her congratulations and good luck in her new role.

2017-2018 seminar series

ISE HOSTED A SERIES OF SEMINARS AND LECTURES FROM A VARIETY OF HIGH-PROFILE SPEAKERS.

SEMINAR SERIES FALL 2017

AUGUST 22
Giorgio Fasano, Thales Alenia Space. "Solving Non-Standard Packing Problems by Global Optimization and Heuristics".

SEPTEMBER 19
Alejandro Ribeiro, University of Pennsylvania. "High Order Methods in Empirical Risk Minimization".

SEPTEMBER 26
Andrew Dorsett, Wolfram Research. "Mathematica 11 in Education and Research".

OCTOBER 5
Nick Trefethen, University of Oxford. INFORMS Chapter Distinguished Speaker.

OCTOBER 10
Ion Necoara, University Politehnica Bucharest. "Conditions for Linear Convergence of (Stochastic) First Order Methods".

OCTOBER 31
Oleg Prokopyev, University of Pittsburgh. "Sequential Max-Min Bilevel Linear Programming with Incomplete Information and Learning".

NOVEMBER 7
Osman Ozaltin, NC State. "A Branch-and-cut Algorithm for Discrete Bilevel Linear Programs".

NOVEMBER 14
Jonathan Eckstein, Rutgers. "Asynchronous Projective Splitting for Convex Optimization and Monotone Inclusion Problems".

NOVEMBER 30
William J. Cook, University of Waterloo. "Guiding the Cutting-Plane Method".

DECEMBER 5
Garud Iyengar, Columbia University. "Automatic Event Detection in Basketball".

SEMINAR SERIES SPRING 2018

MARCH 6
Bo Zeng, University of Pittsburgh. "Robust and Chance Constrained Optimization in Power and Logistics Systems".

APRIL 10
Stefano Coniglio, University of Southampton. "Network Routing Through the Internet as a Stackelberg Game".

APRIL 19
Matthias Walter, RWTH Aachen University. "Investigating Polyhedra by Oracles".

APRIL 24
James Renegar, Cornell University. "A Simple Nearly-Optimal Restart Scheme for Speeding-Up First Order Methods". INFORMS Chapter Distinguished Speaker.

MAY 1
Henry Lam, Columbia University. "Assessing Solution Quality in Stochastic Optimization with Limited Data".

MAY 8
Krzysztof Choromanski, Google. "Structure is all that you need – Learning Compressed RL Policies via Orthogonal Gradient Sensing".

Welcome to our new Advisory Council members…

KEVIN DEHOFF '85

Kevin Dehoff is a leader in McKinsey's global Aerospace & Defense Practice where he supports strategic business transformations and leads a wide range of operating excellence initiatives.

In the strategy area, Kevin led a recent project for a global defense electronics business that identified new opportunities for growth in core, adjacent, and international markets. In another engagement, Kevin lead a strategy definition and supply chain restructuring program for a US helicopter manufacturer, an effort that encompassed manufacturing strategy, footprint consolidation, total cost restructuring, supply chain strategy and integration.

Several recent engagements were aimed at increasing affordability of programs and capturing savings in operating functions. He spearheaded a McKinsey team's market-based affordability and cost transformation program for an aerospace & defense prime contractor which resulted in over $2 billion of savings in direct labor productivity, indirect cost, direct material procurement, and major sub-contracts.

Kevin holds a B.S. in Industrial Engineering from Lehigh University and an M.B.A. from the Wharton School of Business at the University of Pennsylvania.

IRA FEINBERG '69

After a number of years leading his own process and business performance optimization consulting firm, Ira decided to join Tata Consultancy Services (TCS), which has the resource mass and advanced technology skills to implement the transformation opportunities his consulting discovers and rationalizes. At TCS, Ira serves as a Lead Consulting Partner for Insurance clients on the BFSI Go-to-Market team. Ira has focused on process and operations optimization for more than 30 years, including a dozen as a KPMG partner responsible for a variety of national consulting practices including IT strategy/transformation, Insurance Technology & Ops consulting, investment risk, as well as having many large financial services client roles. He has also held senior executive roles in financial firms, leading global development for Morgan Stanley and serving as a divisional CIO at Bankers Trust. In addition, he formed and was CEO of a software company with angel funding to build out the innovative TEPO software and assist many global financial firms to optimize their key processes.

Ira holds a B.S. in Industrial Engineering from Lehigh University.

KARYN LIBRADER '91, '95 G

Karyn has more than 23 years of IT consulting experience with deep skills in planning, design, and implementation of transformational capabilities with a particular focus on benefits realization and value creation. She is currently the New York location lead for Accenture's technology women's group. She has been with Accenture since 1995, and her current role is Director of Operations for Accenture's Product & Platform Engineering Services business. She has received many honors, including Accenture's North America People Developer Award, and has been certified at the highest level as a Technology Delivery Lead and Digital Delivery Lead.
Karyn earned her B.S. in Business and Economics and her M.S. in Industrial and Manufacturing Systems Engineering from Lehigh University.

As we bid farewell to four ISE Advisory Council members.

KURT LESKER IV, '05

President, Kurt J. Lesker Company

JASON LAMBERT, '99

Vice President, Global Military Systems & Services, Sikorsky Aircraft

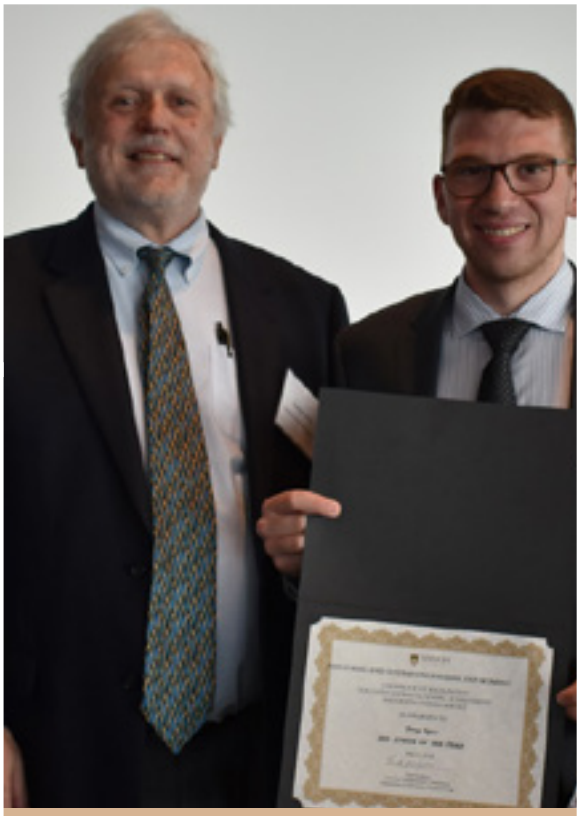
KATHLEEN TAYLOR, '87

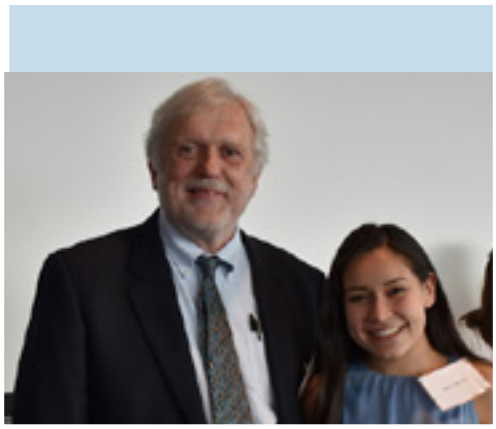
Vice President, J&J Operating System, Johnson & Johnson

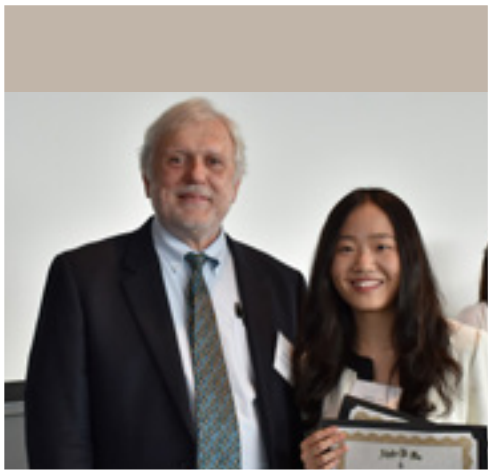
RAY HOVING, '69, '71 G

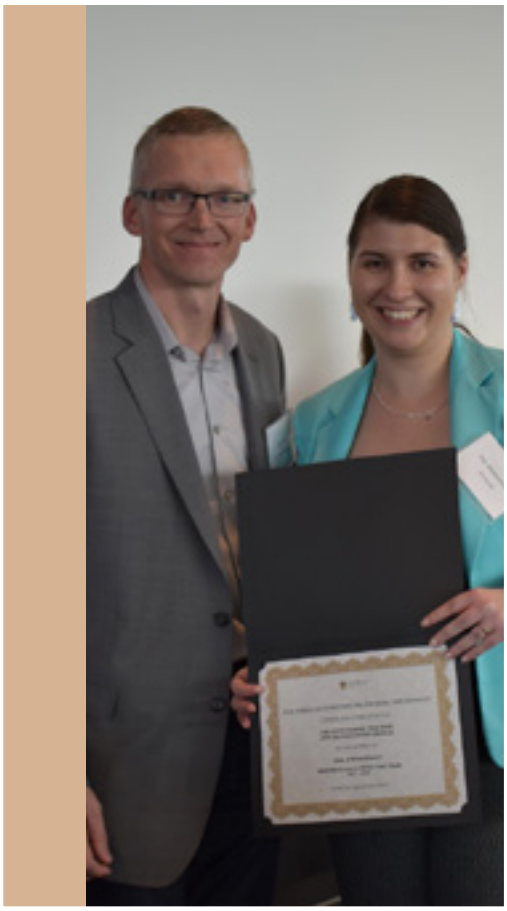
Retired

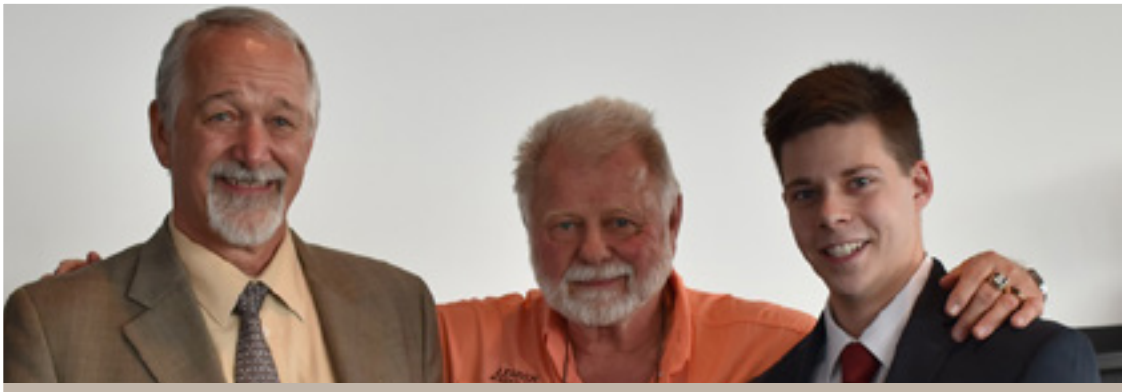
ISE DEPARTMENT ANNUAL BANQUET











celebrate

SOPHIA PAROLA
major: ISE

What did you do this past summer?
Last summer, I worked for Deloitte as a Technology Risk Advisory Intern in New York City. I was involved in performing "tech audits" of various large firms. This entailed evaluating client's technology processes to ensure there were no failures in the system. I was able to see a broad overview of the systems that the clients were using while also gaining a detailed understanding of the portion of the system that I was responsible for reviewing.

What led you to choose ISE?
I was interested in studying engineering, but I wanted to do something that was very broad. The nature of ISE is to solve problems and improve efficiency. As a result, an ISE can be utilized in every sector. The ability to apply similar principles to a variety of problems provided the level of flexibility that I was looking for in a career.

What are you currently working on?
I am currently working on a capstone project with Lehigh Valley Health Network. We are developing a program that utilizes modern technology to maintain the independence of seniors and bring peace to their families. Ideally, seniors will be able to take a few relevant measurements each day, using bluetooth devices, for review by nurses and other medical professionals. This way, providers will be able to intervene earlier, before a patient's medical issue escalate to detrimental levels. The solution sounds simple, but the healthcare sector is very sensitive to changes in processes and technology. My team and I are working on making these transitions smooth for patients and providers.

What will you be doing after graduation?
In the fall, I will be starting with Deloitte full time as a Technology Risk Advisory Consultant in New York City. I am eager to begin my career at a large firm where I expect to learn every day, make valuable connections, and develop my technical skills.

What is something ISE has taught you?
ISE has taught me that there is more thought put into a firm's decisions than I had previously believed. Before starting at Lehigh, I never went to Disney and wondered what calculations went into deciding how large to make the waiting areas for each ride. As technology continues to evolve, firms are able to be leaner and more efficient by putting more thought into these decisions with the help of Industrial & Systems Engineers.

FRANCISCO GUTIERREZ
major: ISE

What did you do this past summer?
Last summer I worked at PwC as a Start Advisory intern in the NYC office. I rotated around some of the different advisory services that PwC has to offer and had the opportunity to learn and network within the Firm. I also had the opportunity to shadow a Financial Crime Units project where I used my data analytics skills to perform budget analysis for the team. I am proud to say that I will be returning to PwC next summer as a Technology Consulting intern.

What led you to choose ISE?
I chose ISE because I believe it is a bridge between engineering and business, and because of the broadness of Lehigh's ISE curriculum. Industrial engineers develop a mix of hard and soft skills and an understanding of the business world that give them a unique insight in any project they are assigned to. On the other hand, Lehigh's broad ISE curriculum allows students to gain expertise in their areas of interest by taking the technical electives that align with these interests. In my case, I want to learn about optimization, data analytics, and machine learning.
What kind of research are you interested in doing?
I am currently taking an optimizations models and applications class which has sparked my interest in operations research (O.R.). Thus, I am interested in pursuing an O.R. project because I believe the future of decision making and sustainable growth lies in O.R. I have already expressed my project interest to a Lehigh ISE faculty member and received positive feedback about it. Similarly, I am registering for the INFORMS O.R. & Analytics competition where I hope to further develop my optimization and problem-solving skills. The theme for this year's competition is "Redefining Vehicle Delivery with Autonomous Cars".

STEVEN ALTIERI
master's program

What are you interested in doing after graduation?
I believe that the future of successful and sustainable businesses lies within technology innovation. Thus, after graduation, I want to work in the Technology Consulting field because I want to solve complex business problems through thought leadership and innovation. Hopefully, I will receive a full-time offer from PwC after my 2019 internship to pursue this career.

What is something ISE has taught you?
ISE has taught me that no problem is unique. It is through the tools we learn at school and work, and our critical thinking abilities that we can solve today's complex problems. One common learning objective in the different classes I have taken is to develop the ability to effectively analyze unstructured data to arrive to precise, optimal solutions. I believe this is an indispensable skill to have in the workplace as the answers to most of today's unique problems lie within these immensely large sets of data.

Tell us about your internship this past summer.
This past summer, I interned for the Principal Financial Group in Des Moines, Iowa as a Quantitative Scientist and Operations Research intern. During the internship, there were two main projects that I worked on, both of which were in team environments. One project was to use both financial and market data to predict various companies' abilities to meet financial obligations. The other project was to predict both apartment and office rental rates in the Washington D.C. market using both market and submarket data, where the model developed from the D.C. market would likely be applied to other markets in the United States. In both of these projects, my team and I used the R programming language to analyze and visualize the data, as well as to create models using statistical and machine learning techniques.

What led you to choose Lehigh's ISE program for your degree?
I graduated from Franklin & Marshall College in May of 2017 with a Bachelor of Arts in Mathematics and I was looking at a variety of business analytics and operations research graduate programs to prepare myself for full time, professional work. Lehigh's ISE M.S. program was appealing to me because of the diverse curriculum and the flexibility to choose classes that I wanted to take and would prepare me for full time work. So far, the ability to take classes incorporating a variety of subjects, such as probability, statistics, operations research, and project management has been a terrific complement to my undergraduate studies. I also liked the location of Lehigh and the university's strong alumni network. It did help as well that several people I went to high school with seemed to have positive experiences at Lehigh.

What kind of projects are you working on?
Last fall, I did work on a project with a couple other graduate students that was sponsored by the Principal Financial Group and supervised by Professor Luis Zuluaga. While I did not see the project to completion, it prompted my interest in data analytics and exposed me to the applications of data analysis in a professional setting. During my internship with Principal, part of my job involved research to gain a better understanding of the context of the models we were working with and in certain instances, use information to engineer variables into our model to provide more accurate predictions.

What are you interested in doing with your degree?
I am interested in a variety of data analytics and consulting jobs with my degree. In many cases, there are various opportunities that incorporate data analytics to guide consulting. Being able to communicate results and presenting strategic options to a variety of stakeholders based on analytical work accomplished on an individual and team basis is very appealing to me. Because data analytics provides opportunities across a variety of industries, I am not restricting myself to a specific field at this time.

What is your favorite part about the department?
I enjoy both the geographic and intellectual diversity of the professors of the ISE Department. Many professors I have learned from have come from all over the world. Their unique perspectives have enriched my graduate education and reinforced that graduate studies in the department has been a very good fit for me to keep growing and developing.

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