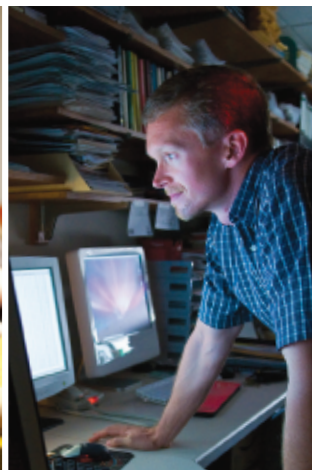


Industrial and Systems Engineering

Newsletter 2012



ACHIEVING GLOBAL STATURE

Lehigh ISE named finalist in new prestigious award from INFORMS – the only department of its kind to make the list.





ISE faculty and Ph.D. students celebrate after the hooding ceremony this past May.

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ISE Department Newsletter Fall 2012

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Dear Friends,

I'd like to welcome you again to the next edition of the ISE department's newsletter. I hope you had a relaxing summer and enjoyed some time off with your friends and family. The ISE department again had a very active past year with lots of new developments that we're excited to share with you.

The department strives to maintain academic excellence and our prestige across the country. I am privileged to report that the ISE department was selected as one of the three finalists of the UPS George D. Smith Prize at the Institute for Operations Research and the Management Sciences (INFORMS) Analytics Conference.

The UPS George D. Smith Prize is created in the spirit of strengthening ties between industry and the schools of higher education that graduate young practitioners of operations research. INFORMS, with the help of CPMS (The Practice Section of INFORMS), awards the prize to an academic department or program for effective and innovative preparation of students to be good practitioners of operations research, management science, or analytics.

The other two finalists were the Tauber Institute for Global Operations, an institute with a certificate program at the University of Michigan, and the professional master programs of the School of Operations Research and Information Engineering at Cornell University. The prize went to the Tauber Institute however, the ISE department can be extremely proud of this prestigious recognition.

To be among the top three ranked programs, and being the only department coming with a complete package of undergraduate, master's, and Ph.D. programs, allows us to claim that Lehigh's ISE is the most innovative department in the country. You can read more about this recognition on pages 4 and 5.

Other great recognitions include the Deming Lewis Award to Bob Storer, the IIE Book of the Year Award to Larry Snyder, and the IIE Captain of the Industry Award to our Distinguished Alumnus John McGlade '76, '80G.

Our Healthcare Systems Engineering (HSE) master's degree program has had a very successful first year. We have 20 students in our inaugural class. Our new HSE Industry Leadership Board (ILB) is comprised of leaders in healthcare who advise us about the focus of the program and provide projects and internships to our students. You can read about a few of our board members in this newsletter.

This year, we will be focusing on the upcoming ABET accreditation process. This will be an intensive year-and-a-half review of the entire engineering college. Associate Dean Greg Tonkay and Associate Chair George Wilson have been working tirelessly to make sure that all undergraduate programs of the college and the department gain the full six years accreditation.

I'm always happy to hear stories from our alumni about their time here at the department and Lehigh during our events. We hope that you are able to take some time out of your busy schedules to join us for these gatherings and catch up with your professors and friends.

As you read through our newsletter, you will see that we continue to grow and work toward continuous academic and research excellence. Your support, suggestions, or just simple observations are critical for making informed decisions about our department. Please feel free to send me your memories, opinions, ideas, or anything else you may want to share with me.

I'm looking forward to seeing and hearing from you soon.

All the best,



Tamás Terlaky



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Standing among the nation's elite



From left to right, Robert Rappa '11, '12G, Gus Gustafson '74, Aurélie Thiele, and Tamás Terlaky

*we can claim
to be the most
innovative
department in
the country...*

Lehigh's Industrial and Systems Engineering department (ISE) takes pride in its ability to prepare students for careers in industry and academia. Its many successful alumni testify to this commitment—as does a recent national honor.

Last month, the department was chosen by the Institute for Operations Research and the Management Sciences (INFORMS) as one of three finalists for the new UPS George D. Smith Prize. INFORMS is the world's largest professional society devoted to operations research, management science, and business analytics.

Named for the late CEO of the United Parcel Service, the Smith Prize promotes stronger ties between industry and higher education while recognizing an innovative academic department or program that effectively prepares students for careers in operations research, management science, or analytics.

Of the three finalists, Lehigh was the only academic department selected. The University of Michigan's Tauber Institute for Global Operations won the prize. Cornell University's School of Operations Research and Information Engineering Master of Engineering Program was also chosen.

Tamás Terlaky, department chair and the George N. and Soteria Kledaras '87 Endowed Chair Professor of Industrial and Systems Engineering, said the honor reflects ISE's continued improvement.

"Being rated one of the three best is a wonderful feeling," said Tamás. "It's great that we can claim to be the most innovative department in the country."

"This award places Lehigh among the most elite universities in understanding how to develop leaders in the field of analytics, the newest discipline to provide global competitive differentiation," said Gus Gustafson '74, managing director of Lehigh's Enterprise Systems Center.

Capitalizing on an "amazing" opportunity

The finalists made their presentations on April 15 at the INFORMS 2012 Conference on Business Analytics and Operations Research in Huntington Beach, Calif.

Proposal leader Aurélie Thiele, associate professor of Industrial and Systems Engineering, was joined by Terlaky, Gustafson, and Robert Rappa '11, '12G at the presentation.

Rappa discussed the master's thesis he completed under Thiele's supervision. The project sought to determine the attributes of people who have defaulted on student loans but are more likely to resume payment if they are contacted. Rappa used analytics, including statistical analysis, technology, and advanced calculations, in the project.

"Attending and presenting at the INFORMS Analytics conference was an amazing experience," said Rob, who is joining IBM Global Business Services this summer. "I am extremely proud and grateful to have had the opportunity to travel across the country to talk to leaders of academia and industry about the ISE department."

To meet the needs of undergraduate and graduate students, the ISE department has added new courses and programs and restructured current ones.

"The design for a refined undergraduate program is crystallizing," said Tamás, "and our professional master's of engineering program in healthcare systems engineering is very much operational. Our first graduates are graduating in August 2012."

The department's Ph.D. program and six master's level programs have placed alumni at leading companies, research labs, and universities worldwide, said Terlaky.

Applying OR to cancer treatment

The Memorial Sloan-Kettering Cancer Center (MSKCC) received the 2012 INFORMS Prize for outstanding widespread use and influence of operations research throughout the company. Nick Kastango '10, a strategic analyst on the Quantitative Analysis and Strategic Initiatives team, was one of the team members who received this prize.

"The award is recognition of the hard work that our team (in particular, Ari Caroline, our director, and Isaac Wagner, a senior analyst and now analytics manager) has done over the years," said Nick.

About eight years ago, the team, which started small, began working on targeted projects, demonstrating the power and value of operations research (OR) and analytics. This has helped move them from a small support team to a group that influences decisions throughout the institution.

"It's great to know that the work I'm doing with this team is helping MSKCC's physicians, nurses, and technicians, and ultimately our patients," said Nick. "Plus, I get to work closely with an amazing team of dedicated, passionate people!"

OR and analytics are used in multiple aspects of the MSKCC organization, including cancer treatment. The team applies operations research, data analytics, and strategy to help hospital leadership, clinicians, and front-line staff to make more informed decisions about the future. This includes resource planning and optimization; performance measurement and forecasting; and market and strategic analysis.

"Historically, most of our work has been related to planning and operations, but we have recently begun applying our tools to the field of clinical analytics—how can we use our data to help our clinicians and patients? This has led to our recent collaboration with IBM to build a tool that will allow community oncologists to tap into MSKCC's expertise and the most recent advances in medicine and science when treating their patients," said Nick. "To do this, our team and our physicians are working with IBM technologists to train their Watson artificial intelligence system on the diagnosis and treatment of cancer."

Not only has Nick had the opportunity to work on the Watson project, but he has also been working on several other projects.

"One of the projects I have worked on is with a gastric surgeon who is very interested in preventing complications that occur after a patient receives a surgery," said Nick. "Our team is building a predictive model that will assist her (and other surgeons) in determining which patients are at the highest risk for a complication based on a wide variety of factors, such as other diseases they have or the difficulty of the surgery. Some of our other projects include understanding trends in patient activity, determining future demand for certain types of treatment, and helping senior leaders evaluate major capital expenditures."

With all the projects that Nick has been working on, he credits Lehigh and ISE for preparing him for his current role.

"Lehigh provided me with a very broad set of skills and let me get my hands dirty with real-world problems. In my work, nothing is ever as simple or straightforward as a textbook problem, so my experiences with my senior project gave me an introduction to the ambiguity and imperfect information that's missing from the classroom."



Analytics in the recovery of defaulted student loans

Rob Rappa '11, '12G got the opportunity of a lifetime. He was asked to join Professors Aurélie Thiele, Gus Gustafson, and department chairman

Tamás Terlaky to attend the INFORMS Analytics conference as the live student testimonial for the UPS George D. Smith Prize presentation.

"I told my story of how the Lehigh ISE department has helped me develop into a successful practitioner of analytics," said Rob. "My tale covered my entire Lehigh career, from how I chose the department before ever stepping on campus to my great academic and experiential learning opportunities throughout my undergraduate and graduate study."

While the department did not receive the prize, getting recognized among the top three is something the department can be extremely proud of.

"This recognition solidifies the department as a leader in analytics and one of the best in the world for bridging academia and industry," said Rob. "For students it should help validate that the work done here really does matter and is known to help develop successful practitioners. Alums should also be proud that their alma mater is prospering."

Besides attending the conference, Rob was also kept busy this year with his fraternity, Delta Phi, and completing his thesis titled "Analytics in the Recovery of Defaulted Student Loans."

Rob's research investigates the use of analytics in the recovery of defaulted student loans. Descriptive analytics were used to analyze the distributions of and correlations among more than 30 different borrower features; this was essential in identifying which features discriminate well between borrowers who will or will not make payments given that they have already defaulted. These features were then used within predictive analytic methods to generate models that will classify future borrowers as payers or nonpayers.

"Ultimately these models will help guide financial firms' efforts in servicing loans and recovering debt," said Rob. "Immediately my work will help financial firms, or anyone interested, understand how socioeconomic and academic features relate to borrowers making repayment given that they have already defaulted on their student loans. Our predictive models will also help financial firms much more effectively utilize their efforts in recovering what would otherwise be lost debt."

"Thinking a bit more broadly, my work will hopefully help promote and perpetuate the use of analytics in industry. The use of analytics can help uncover significant insights and guide decision makers; my work serves as further proof of this."

Rob will be starting as a consultant at IBM Global Business Services in New York City this August. He will always remember the great times here at Lehigh and at ISE.

"I enjoyed the sense of family and camaraderie among the faculty, staff, and students within the department. It's been great walking into Mohler and seeing familiar and friendly faces the past few years (and essential for the occasional late night cram sessions)."

Karl Brisseaux '11 contributed to this article.

Engineering solutions in healthcare delivery

By Kurt Pfitzer

Solving one of America's most challenging problems—a healthcare system that consumes one-sixth of the economy—will require a multifaceted solution, experts said at a recent conference at Lehigh.

The Integrated Healthcare Delivery Workshop, which drew 100 people, featured panel discussions on “Promoting Innovation” and “Provider Perspectives” and addresses by experts in systems engineering, economics, health insurance, public policy, and other fields.

The event was sponsored by Lehigh, the provost's office, the College of Business and Economics, and the P.C. Rossin College of Engineering and Applied Science. Bob Storer, Hisham Nabaa and Tamás Terlaky were among the lead organizers for the workshop. Hank Korth from Computer Science and Engineering, Sue Sherer from Management, and Chad Meyerhoefer from Economics were also the organizers of the workshop. Provost Patrick V. Farrell opened the event.

James Benneyan, director of the Healthcare Systems Engineering Program at Northeastern University, said America's healthcare industry is plagued with inefficiencies, errors, unequal access, variabilities in practice, and patient safety issues.

In addition, he said, the national cost of healthcare, estimated at about \$2.7 trillion a year, is increasing twice as fast as inflation.

Systems engineers can improve healthcare, said Benneyan, as they have streamlined the airlines and other industries, by using mathematical, simulation, cognitive, and operations models to optimize the processes that make up healthcare delivery.

“There are a huge number of opportunities to build a better healthcare system with systems engineering,” said Benneyan. “We need more emphasis on the training of undergraduate and master's level students in programs that expose them to real-life practice.”



Tim Ward, Martin Ciccocioppo, Brian Lobley '00 and Robert Richardson on the “Promoting Innovation” panel.

Lehigh's engineering college recently created a professional master's of engineering program in healthcare systems engineering (HSE). Housed in the department of Industrial and Systems Engineering, HSE will graduate its first class this summer. Its advisory board includes representatives from the Mayo Clinic, hospital networks, and home healthcare companies, as well as the insurance, pharmaceutical, and consulting industries.

The panel discussion “Provider Perspectives” was moderated by Tom Cassidy '87, area director for operational quality assurance for Bayada Home Healthcare, and featured officials from St. Luke's University Health Network, the Memorial Sloan-Kettering Cancer Center, Lehigh Valley Health Network, and the Mayo Clinic's Systems and Procedures Division.

“Promoting Innovation” was moderated by Chad Meyerhoefer, associate professor of economics at Lehigh, and featured officials from the Hospital and Healthsystem Association of Pennsylvania, Independence Blue Cross, the Bureau of Medicine and Surgery of the Navy, and the Pennsylvania Department of Health.

Ed Force receives the Tradition of Excellence Award

Ed Force received the 2011 Lehigh Tradition of Excellence Award last summer. Ed was nominated by Associate Dean Greg Tonkay for his leadership and accomplishments with the Mohler Lab renovations.

“I was surprised and honored to receive this award. When the university acknowledges you, it’s very rewarding,” said Ed. “I have been employed for many years here at Lehigh, and ISE is a great department to work for. We’re a family-oriented department, and I believe that many others should follow our example.”

This program recognizes members of our Lehigh community whose dedication, imagination, creativity, and leadership contribute to making our university a better place to work and learn.

“The first floor of Mohler Laboratory has undergone major renovations in the past three years. ... While it is not part of Ed’s job description, he took the lead in demolition, temporary storage, and relocation of equipment. He also played an important role on a team convened to redefine the Man-Tech Lab’s mission and lay out the space,” says Greg.

“I would like to thank the department as a whole,” said Ed. “At times it’s challenging, but overall ISE is one of the finest departments to work for.”



Ed Force and Greg Tonkay at the Tradition of Excellence Award ceremony.

Students compete in annual Analytical Finance Capstone Competition

Master’s students in IE 441 (Financial Engineering Project course) competed against each other in the annual Lehigh Analytical Finance Capstone Project competition. The first place team, Adam Howse, David Martz, Carlynn Schlemmer, and Edward Valentino, presented their project titled “Modeling and Mitigating Systemic Risk in Networked Financial Systems” this past spring.

The goal of the project was to model systemic risk resulting from default contagion in the financial system and to evaluate the impact of mitigation techniques such as bilateral netting agreements and centralized clearing platforms.

The idea is that all banks are connected with each other because of all of the transactions they make between one another, so if one defaults, this will affect the banks that were on the other end of that bank’s deals. They might then be dragged into default as well. That’s why default can propagate through a financial network and possibly imperil the stability of the whole system.

“Bilateral netting agreements are agreements where you only focus on the outstanding amount of money. For example, if I owe you \$10 and you owe me \$5, I just have to give you \$5 and you don’t have to give me anything. Centralized clearing platforms add a central intermediary to take any risk previously assumed by the banks,” said Professor Aurélie Thiele, the project team’s adviser.

The students developed a simulation model in ARENA (simulation software) to build a stylized model of bank exposures, subject it to financial shocks, and follow the propagation of defaults in the network, on multiple data sets calibrated to mimic the U.S. financial system. They first replicated the approach in a landmark paper by Professor Rama Cont of Columbia University. They then designed and implemented mitigation techniques (to decrease the number of defaults by contagion) and used statistics to quantify their impact.



The winning team with Aurélie Thiele and Wilson Yale.

The students’ main finding was that bilateral netting agreements were the most effective in curbing systemic risk.

Second place was a tie between Shengjun Li and Yi Wu and Yizhi He, Xuan Luo, and Siyu Yu. Third place went to Rui Liu, Shuyi Wang, and Jingyi Ye.

The students presented to Aurélie and to former ISE Advisory Board member and sponsor for the first-place project Wilson Yale ’73, ’76G, ’78Ph.D. in the Analytical Finance Capstone Competition.

“Wilson’s main responsibilities were to provide the industry perspective, while I provided the day-to-day feedback. He gave the high-level project idea to the students and provided feedback about overall direction,” said Aurélie. “It is great to have collaboration between our alumni and department to provide a fulfilling educational experience for our students.”

Soaring from the ISE nest

By Amanda Fabrizio

I have been at Lehigh now for nearly four years. It's very hard to believe that I have been with this year's graduating class since they were first-year students. Time truly does fly.

During these past four years, I've built friendships and camaraderie with not only the faculty and staff but with the graduate students as well. One of my first weeks here, Daniel Scansaroli '05, '06G, '09G, '12Ph.D., came into my office, introduced himself as a teaching assistant, and told me about his IBE student team, that they were going to be torn apart by tigers (venture capitalists who evaluate the projects), and that it would be a great story for the ISE website. It was my fascination with jungle cats that got me to watch the first student presentations by the IBE team, and introduced me to the graduate student world here at ISE.

When Dan told me that he was (finally) graduating this year, it seriously felt like I was losing a limb. He has been my go-to guy for several of our ISE events, especially the 60th-anniversary celebration. One of the downfalls of working in higher education: Your go-to, best students for years do eventually graduate and leave the nest.

A few months before commencement, Dan sent me a very heartfelt email request. He asked me if I would nominate him to be the graduate student speaker for graduation. Faculty, students, and staff were invited to nominate a commencement speaker who has produced excellent and interesting research and would be exemplar of the graduate experience.

I asked Dan why he wanted to be the speaker. He would be speaking in front of graduates, their parents, students, faculty, staff, alumni—the list goes on. One of the top fears people have is public speaking, so why would a 20-something want to do that?

"I felt that I had a story to tell based on the unique perspective of an individual who was both an undergraduate and a graduate student at Lehigh. The distinct international experience of graduate school is one of mind-opening enlightenment about different cultures and life experiences," said Dan.

"I felt that I needed to discuss how the shared hardship of graduate work encourages graduate students to adapt and learn from each other's vastly different backgrounds and leave with new views of the world and how we can work together," said Dan. "The Lehigh graduate experience is transformative. Graduate students find commonalities that result in a peaceful collaborative approach to solving complex problems."

A few weeks later, Dan called me and told me that he was going to be the graduate student speaker at graduation. Being the "quiet, shy person" that I am, I congratulated him and told him he would be a fine representative of the graduate student population and the department.

Some of Dan's excerpts that follow truly show that Lehigh is indeed a global community in this small area known as the Lehigh Valley.



Stephen Mansour, Prof. Bob Storer and Dan Scansaroli at the hooding ceremony.

If we leave graduate school with one ultimate lesson, it is that in our common goals and difficulties, we can find solutions through collaboration and open-mindedness.

Of Lehigh's full-time graduate students, 60 percent are international students representing 108 countries. Who would have thought that in a little town in Pennsylvania there would be a peaceful global community where people from countries in conflict had found a way to work together to solve problems? It truly gives hope.

So, as we go into the world as masters and Ph.D.s from Lehigh, let us expand upon our international education; let us encourage others to go outside their comfort zones, to throw away preconceptions and open their minds to others' experiences; but most importantly, let us continue to collaborate as a global union to solve the complex problems facing the world.

"It was an incredible honor to be able to represent my fellow graduate students at commencement. Being able to give the speech was the perfect finale to my long educational experience at Lehigh," said Dan.

Dan married Jennifer Elliott '04, '05 this July and moved to New York City to work as an investment product specialist in JP Morgan Chase & Company's private bank.

There comes a time in all of the ISE students' lives to leave the Mohler Lab nest and soar. All of them will go to do great things, make changes in the world, and make Lehigh and ISE proud. Dr. Scansaroli has already begun to soar and make us proud.

Megan Colville '12 speaks at Honors Convocation

By Andra Portnoy '14

This past spring, students, parents, and faculty gathered in Zoellner Arts Center for the 33rd Honors Convocation.

The event was co-planned by President Alice P. Gast and the office of the provost to honor juniors and seniors with outstanding academic achievements. The convocation began with introductory remarks from Gast, followed by remarks made by Patrick V. Farrell, provost and vice president for academic affairs.

Megan Colville '12 was the student speaker for the P.C. Rossin College of Engineering and Applied Science.

Colville is pursuing an integrated degree in industrial engineering and political science and plans to go to law school post-graduation. She is a Martindale Student Associate and an Admissions Fellow.

"I was honored that I was selected to speak at the 2012 Honors Convocation on behalf of the College of Engineering," said Colville. "It means a lot to me that the IE department has confidence in my abilities and accomplishments, and it feels great to be recognized for my hard work."

In her speech, Colville spoke about the importance and value of the connections she made at Lehigh.

"Throughout my four years here, I have been building up these connections with Lehigh faculty, students, and alumni, both purposefully and incidentally, and as I now near graduation, I am beginning to realize their importance," Colville said.

This summer Megan will be working in the Contract Administration department of PPL EnergyPlus, an energy marketing and trading company in Allentown.

"I struggled a little bit in trying to decide what to write about in my speech," said Colville. "Just in my law school search, I have been connected with Lehigh alumni, and their advice and guidance have been invaluable. The topic is also universally applicable; it applies to all grade levels and majors."

"I hope that after my speech, other students will recognize the value in these connections and take advantage of their opportunities."

For 33 years, the Honors Convocation has been held to honor the outstanding work of Lehigh students. Juniors and seniors who have a GPA of 3.6 or higher or are receiving academic prizes were invited to the event along with their parents. This continues to be an effective way for the university to affirm its commitment to academic excellence.

Designing MISOCO problems

Julio C. Góez hails from Colombia, and currently he is a Ph.D. candidate working on optimization algorithms and optimization software development under the supervision of Dr. Tamás Terlaky. He is expected to finish his Ph.D. by December 2012.

Julio's current research revolves around the development of methods for solving Mixed Integer Second Order Cone Optimization (MISOCO) problems. There are several problems in engineering that can be modeled as MISOCO problems, including the design of telecommunication networks with a minimum length connection network; the design of a supply chain system where a supplier ships products to different retailers, each with random demand; and portfolio optimization with cardinality constraints, i.e., where an investor is allowed to invest in only a small number of securities.

"The main difficulty in solving these problems is the presence of discrete variables in the mathematical formulation," said Julio.

"Additionally, in many situations the decision maker needs to solve a given problem several times in a day, which limits the time available to find solutions. Hence, the goal of my research is to develop methods to solve MISOCO problems, with a large number of discrete variables, as quickly as possible."

Specifically, Julio works in the extension of techniques used for solving Mixed Integer Linear Optimization problems to MISOCO problems. He has been working in this area since 2009 as his Ph.D. research. In this time Julio has been able to contribute to this field with some significant methodological results in a joint work with Dr. Pietro Belotti, Dr. Imre Pólik, Dr. Ted Ralphs, and his supervisor, Dr. Tamás Terlaky.

"In particular, we developed a disjunctive conic cut for MISOCO problems. In some preliminary experiments this novel conic cut has improved considerably the solution time needed to solve some MISOCO test problems," said Julio. "We are encouraged by these results and are working on the development of a software package that incorporates this cut in a Branch-and-Cut algorithm to solve MISOCO problems."

Some of the results of Julio's research have been presented at the annual meetings of the Institute for Operations Research and the Management Sciences in the years 2010 and 2011. He was invited to present his research at the Department of Mathematics and Statistics, University of Calgary, Canada, in December 2011 and at the Group for Research in Decision Analysis in Montreal, Canada, in February of 2012. He currently has a paper under review in the journal *Linear Algebra and Its Applications*; the title of the paper is "On Families of Quadratic Surfaces Having Fixed Intersections with Two Hyperplanes," and in the journal *Mathematical Programming* entitled "A conic representation of the convex hull of disjunctive sets and conic cuts for integer second order cone optimization". Julio's Ph.D. project is sponsored by a grant from the Air Force Office of Scientific Research.

For the second year in a row, Julio was named the ISE Ph.D. candidate of the year, voted on by the faculty.

"It is a great honor to get a reward like this, and feel recognized for my effort," said Julio. "At the same time, it is a commitment with the people who nominated me and my peers. I feel that this reward is not only to recognize what I have accomplished, but also a motivation to keep working hard and show why I deserved to be recognized by this award."

After graduation Julio will be a Postdoctoral Fellow at Polytechnique Montréal, QC Canada under the supervision of Dr. Miguel F. Anjos.





IIE President G. Don Taylor presents John McGlade with the IIE Captain of Industry Award.

“...one of the key learnings for me has been about building and maintaining competitive advantage”

John McGlade receives the IIE Captain of Industry Award

John McGlade '76, '80G, Chairman, President, and Chief Executive Officer of Air Products and Chemicals Inc., received one of the Institute of Industrial Engineers (IIE) Captains of Industry Awards. The other winner was Susan Story, Executive Vice President, President, and CEO of Southern Company Services.

This award honors individuals who have assumed positions of leadership in business, industry, and government. The purpose of this award is to honor IE graduates who have demonstrated leadership in a national or international context and continue to do so, and who identify the IE profession as a key reason for their success.

“It was a great honor for me, and my feelings turned to Lehigh. The foundation of my education in industrial engineering has left a strong and lasting impact on me,” said John. “I felt a deep gratitude to my professors at Lehigh, who “wrote the book,” Wally Richardson, George Kane, and Emory Zimmers, and whose teaching and coaching has stayed with me all of these years. I am very thankful as a CEO for the progress and innovation that industrial engineering has brought to industry and proud to be a graduate of the ISE program.”

During the conference, John was one of the keynote speakers. He spoke about how some of the fundamentals of industrial engineering are creating competitive advantages for Air Products and how these fundamentals influenced his career. John shared examples of how these innovations are driving productivity improvements around the world for Air Products.

John also discussed the growing skills shortage, which he thinks is a critical issue for our country, and why he believes industry, education, and the government must come together to enable our country to compete and prosper as a nation. This includes an educational focus on Science, Technology, Engineering, and Math (STEM) and Career Technical Education (CTE).

“If we are going to have the best workforce, we must not only have outstanding technical education, we need to teach students to be great critical thinkers, to have excellent communication skills, entrepreneurial initiative, creativity, and agility, and to be able to work in multicultural environments with cultural sensitivity,” said John. “They need leadership skills with a flexibility to adapt to changing conditions and a willingness to engage in lifelong learning.”

He went on to say that he hoped the audience understood “how critical industrial engineering is to the success of business and how the innovation that is occurring is driving great productivity and growth.”

“If I step back and look over my career, one of the key learnings for me has been about building and maintaining competitive advantage. It is essential to winning in the market. It is also a never-ending process that has to be continually renewed,” said John. “I strongly believe it is the combination of people, process, and tools that enables a culture of improvement—a culture that provides the foundation for competitive advantage, an essential ingredient to winning and profitably growing in markets.”

Amusement engineering

A first for IBE

There is currently a growing trend of Lehigh alumni entering the workforce as consultants. We see numbers of alumni working for Accenture, Pricewaterhouse Coopers, and KPMG, just to name a few.

The ISE department and the ISE Advisory Board are going one step further by having a group of five Integrated Business and Engineering (IBE) students consult for the department for their senior capstone project. This is the first time a team was assigned a consulting task. This unique project is still an excellent culmination of the program's integrated curriculum, even if it's not product- or technology-focused like other projects.

The Lehigh ISE Advisory Team consists of Yusuf Erkli '13 (industrial engineering), Seth Fortney '13 (chemical engineering), Alex Phipps '13 (finance), Dan Thareja '13 (finance), and Aditi Varma '13 (industrial engineering), all of whom chose to tackle this assignment.

"Most projects in IBE are product focused. This is the first project in the program's history that has been so different, and I wanted to be a part of this new experience," said Dan.

After one semester of work, the team defined that its mission is to objectively comprehend the Lehigh ISE department relative to comparable institutions, identify both cutting-edge ideas and national trends, and formulate a strategic plan that will propel the department to the forefront of its field.

So far, the team has done both internal and external research, as well as created a rough outline of what they plan to achieve by the year's end. Their work has been under the guidance of ISE faculty, staff, and ISE Advisory Board members Jennifer Bodenstab '08 and Anthony Hillman '01, all of whom have been valuable resources.

"I have received the most enjoyment during my time working with our sponsors. When presenting the team's work, it is obvious how invested they are in our project, how much they appreciate our efforts, and how willing they are to help," said Seth. "This sense of appreciation and support makes me know that the work I am doing is both important and meaningful."

The year-long course will keep the ISE Advisory Team working hard, even during summer. Despite all five completing summer internships, they are taking advantage of their geographic distribution to reach out to as many local alumni as possible before returning to Bethlehem. The team wants to connect with ISE alumni to benefit from the diverse perspectives and experiences that our graduates have.

"This summer we each individually reached out to fellow interns and Lehigh alumni who have done something similar to ISE in the area where we will be," said Aditi. "In the fall we will compile this information as well as gain more knowledge on the national trends and gauge current awareness of ISE tracks among first-year students."

After all their hard work, the team will present their findings to the ISE Advisory Board at the end of the fall semester. Already the project has been a rewarding experience to everyone involved, and this will surely continue until the project's end.

Matt Derr '12G has been fascinated with amusement parks since he was a child. Having worked in two different parks during his lifetime—one even while attending school at Lehigh—he knew he wanted to pursue an engineering project in the amusement industry to satisfy his degree requirements.

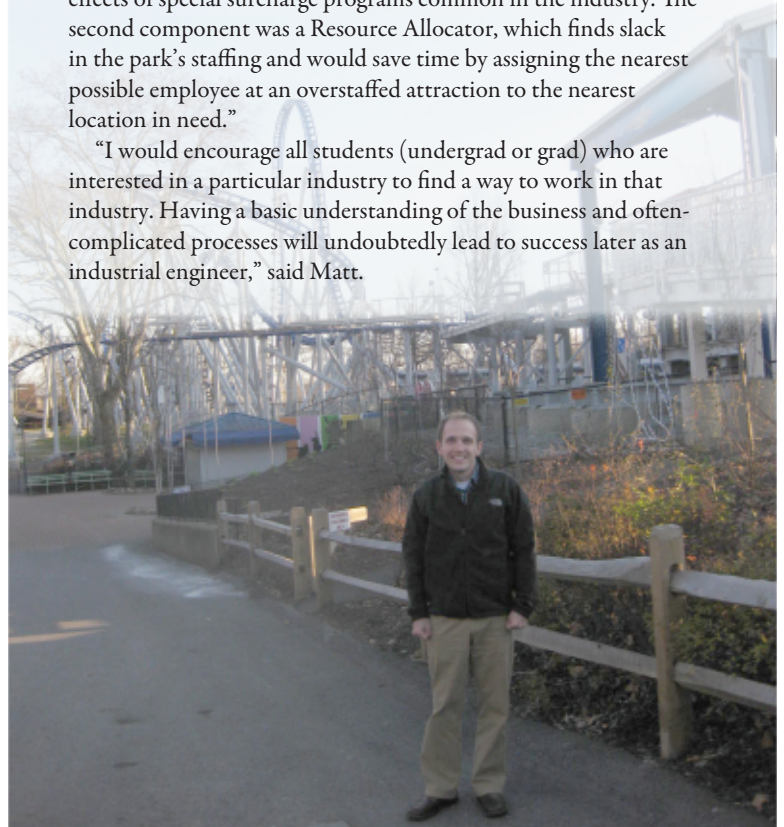
Matt conducted his research project at Kennywood Amusement Park during the summer of 2011. Kennywood, located in West Mifflin, PA, was founded in 1898 as a "trolley park." The park grew over the years and was even named a National Historic Landmark in 1987.

Joe Barron, Kennywood's human resource director, worked with Matt on this project. Matt was challenged to find solutions to industrial engineering related problems facing the park, including improving the allocation of the park's seasonal workforce, improving attendance forecasting, and determining average wait-time for the park's new Sky Rocket roller coaster attraction.

Data was collected and analyzed during their summer operating season, which was used to generate findings and propose recommendations. With the advice of project advisers Dr. George Wilson and Dr. Robert Storer, the final deliverables included an ARENA Simulation computer model of the park's Sky Rocket attraction and a custom-designed computer tool, which was nicknamed the "Lehigh-Kennywood Resource Allocator."

"In this industry, every minute spent in a queue is a missed revenue opportunity for the park, as guests are unable to spend money on games, food, or other revenue-generating activities," said Matt. "It is vital for management to minimize waits as much as possible by improving operational processes, and investigate the effects of special surcharge programs common in the industry. The second component was a Resource Allocator, which finds slack in the park's staffing and would save time by assigning the nearest possible employee at an overstaffed attraction to the nearest location in need."

"I would encourage all students (undergrad or grad) who are interested in a particular industry to find a way to work in that industry. Having a basic understanding of the business and often-complicated processes will undoubtedly lead to success later as an industrial engineer," said Matt.



By Karl Brisseaux '11

ISE celebrates another successful year!

Lehigh's ISE department takes pride in the accomplishments of its students and alumni, who pursue a wide range of careers, from the world's leading financial institutions to analytical operations research.

At its recent annual banquet in Iacocca Hall, the ISE department honored two alumni for career achievements.

Arthur F. "Pete" Veinott Jr. '56 was named the 2012 Distinguished Alum for Excellence in Academia, while Timothy J. Wilmott '80, '81G was named 2012 Distinguished Alum for Excellence in Industry.

Veinott, professor emeritus of operations research at Stanford University, former Guggenheim Award recipient, and member of the National Academy of Engineering, gave two talks as part of the Spencer C. Schantz Distinguished Lecture Series: *"Optimal and Near Optimal Supply Policy for Deterministic Multiperiod Supply Networks"* and *"Polytime Computation of Strong and n-Present-Value Optimal Policies in Markov Decision Chains."*

Wilmott, president and chief operating officer of Penn National Gaming Inc., has established the Timothy J. Wilmott '80 Endowed Faculty Chair in Industrial Engineering and supported renovations to Mohler Lab, the department's home.

"A Lehigh education is a great foundation to do whatever you want to do in your career," said Wilmott, who has worked for 25 years in the casino industry. "It's very humbling to be back here at Lehigh, seeing some old professors I remember very fondly from my time here in the '70s and early '80s. I'm much honored to be here."

The ISE department also honored Robert Storer, professor





of industrial and systems engineering, as ISE Faculty of the Year.

“It’s humbling to win the award,” said Storer, who has served for 25 years on the faculty and is co-director of the integrated business and engineering (IBE) honors program.

“The students are what makes this a great job. I look forward to the fall every year when they come back, and they’re just a great bunch of kids—bright, energetic, and enthusiastic.”



One of those students, Lorand Dragu ’12, received the distinguished senior IE award. Dragu, who will remain at Lehigh to work on a master’s degree in industrial and systems engineering through the Presidential Scholar program, has excelled in the classroom while volunteering with the department during his undergraduate career.



“Winning the award is a very pleasant surprise. I’ve enjoyed being a part of this department; it’s a great group to be around,” said Dragu, a member of the Alpha Pi Mu honor society. The lessons he’s learned as a student, he says, will serve him well in industry, a sentiment echoed by Wilmott.



“The information I deal with and the techniques I learned at Lehigh in operations research, information technology, and motion and time study, I use today in trying to make decisions to run my business better,” said Wilmott.

“I couldn’t be more pleased with the foundation I got here.”



Anthony Hillman '01, Bob Storer, Bob Wolfenden, President Alice Gast and Provost Patrick Farrell at the Lehigh Faculty/Staff Banquet.

Bob Storer receives the Deming Lewis Award

In continuing a tradition that began in 1983, the 10-year reunion class has the honor of selecting the recipient of the Deming Lewis Faculty Award. This award was created in 1982 in honor of Deming Lewis' outstanding service during his tenure as Lehigh's 10th president and is presented to a faculty member who has significantly influenced the educational experience of the 10-year class.

This year, the Class of 2001 chose Bob Storer to receive this award.

"Bob Storer is an exceptional representation of a faculty member with not only excellent teaching skills in the classroom but continued interest in student success after graduation," said Anthony Hillman '01. "He keeps in contact with numerous alumni and keeps them involved through guest lectures and career guidance."

Anthony went on to say that Bob structured his classes to deliver the subject matter in a way that most closely associated with the types of problems encountered in industry. He encouraged active involvement in the IE Professional Society (the Institute of Industrial Engineers) through the Simulation coursework. He also made himself available for questions on course material or other subject matter (even that he wasn't currently teaching).

"I am honored to receive this award, and I am grateful to the Class of 2001, whom I remember to be an exceptional class," said Bob. "I would like to give a special thank you to Anthony Hillman, who continues to exceptionally represent the Class of 2001 through his many activities with the university."

Anthony and Assistant Vice President of Alumni Relations Bob Wolfenden presented the award to Bob at the Annual Faculty/Staff Dinner in May.

"Bob's impact on the alumni of Lehigh University has far exceeded the members of the class of 2001; I was not just presenting on behalf of the Class of 2001, but all the alumni who have been positively affected by his dedication to research and teaching," said Anthony. "I am honored to have had Bob Storer as a teacher and mentor."

Ted Ralphs: Large Scale Optimization

If you ever visit the back hallways of Mohler Lab, you will find a door with a large poster of Albert Einstein on it. The poster states:

"Do not worry about your difficulties with mathematics; I can assure you that mine are still greater."

This office belongs to Professor Ted Ralphs, who develops a wide range of methodologies for solving large-scale optimization problems.

"In a nutshell, optimization involves the modeling and analysis of complex systems, usually with the goal of improving efficiency or simply understanding how a given system operates under certain conditions," said Ted.

For users of this technology, the optimization process begins with developing a model of how the system to be analyzed operates. This involves determining what aspects of the system are under the control of the operator (the variables) and what constraints there are on how the system can be operated. The variables can be things like "How many widgets should I manufacture?" or "How much should I invest in IBM stock?" or "What should my production schedule be to minimize power consumption?"

The focus of Ted's work is on what happens behind the scenes to make the analysis of the resulting model possible. This includes the development of the mathematical theory and associated algorithms. Ted's work does not end with the development of a conceptual algorithm, however. The development of practical software implementations of these algorithms is necessary to bring the solution technology to the real world in order to solve important optimization problems on a large scale.

This last step is one that is often taken for granted, but in general, it is very difficult to translate a conceptual algorithm into a practical implementation because of the limitations imposed by modern computing architectures and programming languages. Overcoming the challenges posed by the bridging of this gap between theory and practice is a theme throughout all of Ted's work. Ted distributes all of this software as open source and enjoys the fact that this means his work can benefit others in ways that he did not envision when developing the software.

"In an age when we are painfully aware that we need to economize on our usage of all of our natural resources, optimization fulfills an obvious critical need in many areas," said Ted.

Ted collaborates both here at Lehigh and overseas in pursuit of his research.

"I work with a number of faculty members at Lehigh, as well as faculty at institutions around the United



States,” said Ted. “I also have quite a few international collaborations. My primary international collaborations at the moment are with groups in Germany, Italy, New Zealand, and Australia.”

Along with being one of the department’s world travelers, supervising four Ph.D. students, and continuously writing technical papers, Ted recently received a grant from the National Science Foundation.

“The National Science Foundation grant is to study conflicting parties or parties in competition. For example, ‘How do I locate retail facilities while taking into account that my competition is going to react by locating their own facilities to compete with mine?’ These problems are associated with a related research area called game theory that addresses the analysis of optimization problems that involve competition and the use of decomposition methods for solving difficult optimization problems. Decomposition methods are used when a system consists of a number of smaller subsystems linked by some high-level constraints, such as separate divisions of a company linked by budget or resource constraints,” said Ted.

For the past 12 years, Ted has enjoyed calling Lehigh and ISE his home, and has been pleased with the supportive environment.

“We have a very collegial department, and I have had a great deal of freedom to pursue my goals, as well as the opportunity to fuel and actively participate in a department renaissance that has exceeded all my expectations. The ISE department today can rightfully claim to be one of the best in the nation, and I feel as though I had an active role in making that happen. This is not an opportunity that most junior faculty members receive.”

Faculty Updates

ISE to lead the INFORMS 2015 Annual Conference

ISE faculty are taking the lead on the 2015 INFORMS Annual Conference which will be held in Philadelphia. Tamás Terlaky is the conference’s general chair, Larry Snyder is the program committee co-chair, Aurélie Thiele the TutORials sessions co-chair, and Katya Scheinberg is the Keynote/Plenary chair. Further leadership of ISE faculty is anticipated as the conference committees and program develops.

Keith Gardiner presented his paper entitled “Virtual and Collaborative Project-Based Learning” at the ASEE Northeast Section Spring Meeting at the University of Massachusetts Lowell this past April. It was accepted for the proceedings after peer review.

Katya Scheinberg received an AFOSR (Air Force Office of Scientific Research), and a DARPA grant. Katya was elected as Program Committee Chair of the 2013 ICCOP (International Conference on Continuous Optimization) conference in Lisbon, Portugal. Katya delivered several invited lectures, including the prestigious Semi-Plenary talk entitled “optimization” at the ISMP (International Symposium on Mathematical Programming) conference in Berlin, Germany

Larry Snyder and Zuo-Jun Max Shen (University of California, Berkeley) received the IIE/Joint Publishers Book-of-the-Year Award from IIE for their book *Fundamentals of Supply Chain Theory*. This award recognizes an outstanding published book that focuses on a facet of industrial engineering, improves education, or furthers the profession. Larry and Max were recognized at the annual IIE Annual Conference in May 2012.

Tamás Terlaky delivered his plenary lecture entitled “Cone Linear Optimization: From LO, SOCO, SDO Towards Mixed Integer CLO” at the international conference “High Performance Scientific Computing: Modeling, Simulation and Optimization of Complex Process” in Hanoi, Vietnam, in March 2012.

Emory Zimmers, Jr. was named a Track Chair for Social, Environmental and Sustainability track at the IIE annual Conference and Expo, May 2012. This involved coordinating six technical sessions during the course of the conference with numerous faculty and industry teams presenting their work on sustainable industry practices. In his role as Director of the Enterprise Systems Center, Emory was also responsible for research and implementation projects with more than 20 companies and over 50 students. The layered mentoring approach coordinated by Robert Gustafson ’74 provided opportunities for experiential learning for more than 70 Lehigh students, many from the ISE department.

Luis Zuluaga received a seed grant from the Actuarial Foundation and the Casualty Actuarial Society Research Committee for his project “Bounds on the expected payments of insurance instruments: A novel computational approach.”

A Day in the Life of the ISE Associate Chair

In 2011, Professor Greg Tonkay was promoted to Associate Chair of Undergraduate Studies for the P.C. Rossin College of Engineering and Applied Science. Shortly after Greg moved across the street to Packard Lab, Professor George Wilson became the Associate Chair of ISE.

In his new role as the associate chair, George is the academic adviser for most of the master's degree students in the department. He also troubleshoots for ISE undergraduate students who come to him when faced with some difficult decisions. George also develops the teaching schedule each semester after the faculty course assignments have been made. He is a representative on the college's Academic Policy Committee and serves as the department representative in various ways, at the chair's discretion.

"As the associate chair, a large number of students have approached me with their course or graduation questions. It has been very satisfying...being able to help them," said George.

A primary responsibility George has for the upcoming year is the annual ABET (Accreditation Board for Engineering and Technology) accreditation. ABET is a nonprofit, nongovernmental organization that accredits college and university programs in the disciplines of applied science, computing, engineering, and engineering technology. ABET accreditation, which is voluntary and achieved through a peer review process, provides assurance that a college or university program meets the quality standards established by the profession for which the program prepares its students.

The entire engineering college will be going through ABET accreditation over the next year. George is responsible for making sure that the department is ready for the review.

"Preparing the department for accreditation includes developing a scheme for systematically acquiring information on program outcomes from the faculty for all courses that our undergraduates take in the department," said George. "Both the Industrial Engineering degree and the Information and Systems Engineering degree are to be accredited once again. I will need to write a 'self-study' that presents, at some length, the department's rationale for being accredited. ABET is about continuous improvement, and we need to show that has happened with our student outcomes, discussing improvements and how we have implemented improvements on an ongoing basis."

Aside from preparing for ABET and helping students, George also conducts research on large-scale resource management, which has been of keen interest over the last 15 years.

"My research interests focus on effective ways to allocate limited resources within large-scale systems to meet a variety of management objectives. There is particular interest in decisions that must be made in a dynamic environment having various sources of uncertainty," said George. "The research that I have been pursuing, primarily with industry partners, will hopefully strengthen the ability of those



responsible for corporate direction to more effectively communicate to those responsible for day-to-day operations an efficient resource utilization policy that dynamically responds to changes in the business environment."

Since coming to the department in 1978, George has truly enjoyed being a member of ISE.

"The department has been fortunate to have a group of faculty and staff, during my many years at Lehigh, that has been enjoyable to be around and work with."

ESC finalist in the UEDA Awards of Excellence

The Enterprise Systems Center (ESC) was a finalist in the University Economic Development Association (UEDA) Awards of Excellence.

Members of UEDA are transforming their campuses into engines of economic prosperity. The UEDA Awards accelerate this process by recognizing leading-edge initiatives and encouraging their adoption among UEDA members. Colleges and universities make five major contributions to the economies they serve:

- They develop talent with the 21st-century skills needed to support high-growth businesses.
- They support networks of researchers, entrepreneurs, high-growth businesses, and regional innovation clusters.
- They develop quality, connected campuses that become entrepreneurial hot spots and magnets for new people and businesses.
- They support the sophisticated strategies and collaborative leadership needed to link, leverage, and align the many assets within a regional economy.
- They provide leading-edge research and analytic tools to enable civic leaders to understand their economy and make decisions quickly to promote collaborative investments.

Colleges and universities nominate their initiatives, and then a UEDA panel selects three to five finalists in each category based on award criteria.

ESC submitted its sustainable manufacturing initiative that involved creation of a collaborative economic development strategy. This was accomplished by means of a series of projects executed by mentored student teams, with the approaches and results shared among other regional manufacturing companies through the ESC Sustainable Manufacturing Forums. The projects employed a systems approach, agility principles, and layered mentoring of interdisciplinary student teams.

“We were especially encouraged to see such positive reactions to the ESC experiential learning model from this large and diverse national association,” said ISE professor Emory Zimmers, director of the Enterprise Systems Center.

“We are working to continuously improve all of our research and educational programs, including a strong emphasis in sustainable manufacturing and healthcare areas. In addition, the results of joint efforts with Lehigh’s advancement office in support of our academic leadership minor and associated programs have been very encouraging,” said Emory. “Winning at the UEDA annual summit in the category of collaboration and leadership was particularly gratifying because of the major emphasis we place on these qualities with our students.”

The ESC is again a finalist in the 2012 UEDA Awards of Excellence.

MOPTA 2012 held at Lehigh

The department hosted the annual Modeling and Optimization: Theory and Application (MOPTA) conference for the fourth year in a row. Chaired this year by Dr. Luis Zuluaga, the three-day conference aims to bring together a diverse group of people from both discrete and continuous optimization, working on both theoretical and applied aspects. The conference had 50 contributed talks from both the academic and industrial fields and offered a wide selection of topics and the traditional MOPTA-AIMMS modeling competition. MOPTA had nine plenary speakers this year, including Kurt M. Anstreicher (University of Iowa), Edgar Blanco (MIT), Andrew V. Goldberg (Microsoft Research), Mark S. Roberts (University of Pittsburgh), Michael Trick (Carnegie Mellon University), Reha Tütüncü (Goldman Sachs), Santosh S. Vempala (Georgia Tech), Henry Wolkowicz (University of Waterloo, Canada), and Stephen J. Wright (University of Wisconsin-Madison).



Being a part of the healthcare solution

Q&A with HSE ILB First Vice-Chair Donna Mulholland

Donna Mulholland has a broad-based healthcare background, including legal, operations, and administration leadership roles. She was initially in-house legal counsel and subsequently the president and CEO of Easton Hospital (and the Valley Health Corporation, Easton, PA). She has served on numerous nonprofit boards. Most recently, she served on the board of the FoundCare Health Center (Palm Beach County, Florida) and is currently on the board of the Quantum Foundation. Donna received her B.A. in humanities from Carnegie Mellon University in 1974 and her Jurist Doctorate from Capital University School of Law in 1977. She's a current member of the Pennsylvania Bar Association, the Northampton County Bar Association, and the Easton Rotary Club. Recently, she received a "Women of Distinction" award from the Girl Scouts of Southeast Florida.

Q. What was it about the HSE program that made you want to get involved with the program?

A. I have been in the healthcare field for more than 30 years. In my retirement, I have invested time as a director of numerous nonprofit boards whose goals were to improve the quality and accessibility of healthcare. I became aware of the groundbreaking Lehigh University HSE initiative through my husband, Dan Mulholland '74, who has been a very active Lehigh alum. I knew it would be a rewarding experience to work with Lehigh University and with the Mayo Clinic on this program. Both are considered giants in their respective industries.

Q. What is the Quantum Foundation, and what is your main role as a trustee?

A. The Quantum Foundation in West Palm Beach, Florida, has invested nearly \$100 million in grants in the past 15 years, with a great deal of the dollars going to improving access to quality healthcare for the uninsured and under-insured in Palm Beach County. The Foundation has a focused mission of increasing healthcare access, improving science and health education, and enhancing the healthcare workforce. With those goals in mind, my experience fits in perfectly with the decisions the board must make about investing in those areas. I serve on the board of trustees and am the chair of the audit committee and a member of the grants committee and executive committee. In my role on the grants committee, I am able to consider each and every grant that is presented to the committee. I can then help the staff and the board members make decisions on which grants would provide the greatest and most sustainable impact on our core funding priorities. I am proud to be a part of a foundation that has a vision of creating a community where everyone has the opportunity to live healthy lives, regardless of their income, education, or background.

Q. What are your main responsibilities as the first vice-chair to the HSE Industry Leadership Board (ILB) and to the ILB nominating committee?

A. My responsibilities as the first vice-chair are to serve as a member of the board and to perform the responsibilities of the chair when the chair is absent. I also work closely with the chair and the university's HSE leadership, and I serve on the ILB's executive committee. When the HSE ILB was being formed, I acted as the initial chair of the search committee to recruit members to its first board of directors. We sought to make sure the board had a diverse background in healthcare, including hospitals, insurance companies, consulting, etc. Now that my original responsibilities as the chair of the search committee have concluded, I currently serve on the nominating committee, which is responsible for maintaining an active and diverse board membership.

Q. What kind of value will the graduate of the HSE program offer to the healthcare field?

A. The areas that need to be addressed in our current and future healthcare delivery systems include overall healthcare performance and outcomes, productivity, process, efficiency, and, ultimately, the high costs associated with medical care. The HSE's goal is to determine the most efficient and effective methods to manage healthcare systems and patient care delivery. What better time in our country's history for a student to be trained in a master's degree program in HSE? The quality of medical care and its high costs are on everyone's mind, including our legislatures, businesses, insurance companies, and the medically underserved and uninsured. The burning social questions are (1) where will we all receive quality healthcare, and (2) how much will it cost us? Each graduate leaves Lehigh University with the potential to make a substantial impact on the future of healthcare delivery and its costs in our country. Who wouldn't want to be part of that challenge and solution?



Leading the Industry Leadership Board

Q & A Chairman Dr. Gary Sieck of the Mayo Clinic

By William Tavani

Dr. Gary Sieck is Dean of Research and Academic Affairs and Vernon T. and Earline D. Dale Professor and Chair of the Department of Physiology and Biomedical Engineering at Mayo Clinic's College of Medicine. He also directs the Biomedical Engineering program in the Mayo Graduate School. Gary received the Mayo Research Educator Award from 2001 to 2004 and was named Mayo Distinguished Investigator in 2007. He is a past president of the American Physiological Society and a fellow of the American Institute of Medical and Biological Engineering. Before joining Mayo in 1990, Gary served on the biomedical engineering faculty at the University of Southern California. This past January, he was elected chair of the Industry Leadership Board (ILB) of the Healthcare Systems Engineering (HSE) program.

Q: Mayo has for four years hosted an international Conference on Systems Engineering (SE) and Operations Research (OR) in Healthcare. When did Mayo begin implementing SE practices?

A: Mayo has been involved with innovation and in the application of engineering principles to medical practices since 1901, when Henry Plummer joined Mayo as a physician. Plummer is widely regarded as the architect of modern medicine. He implemented a wide range of innovations to clinical practice that improved efficiency in patient care. In 1907, he introduced standardized, individualized medical records for patients so that physicians would know what medical tests and treatments patients had received.

Plummer brought systemized approaches to medicine using engineering principles. A Systems and Procedures Group was established in 1947 at Mayo. Industrial engineers were among those they hired. The people in this group are the type of people being trained at Lehigh today in the HSE program.

Q: In what areas of operations has Mayo seen the most dramatic benefit from the implementation of SE practices?

A: Every area really. One example: We have more than 120 surgical starts every morning. The staff and equipment, induction of anesthesia, and post-op care all have to be organized and coordinated. We treat more than 600,000 patients per year. We have to keep track of who they are, what their problems are, who should see them. All this information should be organized so that patients get as much as possible out of a single visit to the clinic. I call this one-stop shopping for clinical care. That's where SEs come in.

Q: What has attracted the Mayo Clinic to collaborate with Lehigh on its new HSE program?

A: We're not a university. We have no school of engineering. Lehigh has an outstanding school of engineering but no medical school. We

started a partnership five or six years ago. We saw advantages for both institutions, first in biomedical engineering but also healthcare systems engineering. Mayo provides outstanding clinical care, but we have to rely on other institutions to provide necessary academic training. So we decided to collaborate with Lehigh. But Mayo is only one of the many places where Lehigh HSE students could get practical experience.



Q: What kind of value will the graduates of the HSE program offer to an institute like Mayo?

A: Finding people trained for the kind of work done by our Systems and Procedures Group is a challenge. By introducing a system engineering approach to healthcare management, Lehigh is doing a great service. Its HSE grads will bring immediate value to our SE efforts.

The ISE department introduced the HSE program in the academic year 2011-2012. In its first year the program enrolled more than 20 students, including MDs, nurses, and some of Lehigh's presidential scholars.

Through the Industry Leadership Board, the HSE program will be able to give students firsthand exposure to the complexities of the industry while providing a much needed forum for representatives from different stakeholder groups to collaborate on innovative healthcare solutions. Member companies include Mayo Clinic, Quantum Foundation, ParagonRX, Bayada Home Healthcare, Susquehanna Health, Capital Blue Cross Lehigh Valley, Highmark Inc., HAP, St. Luke's University Health Network, Lehigh Valley Hospital & Health Network, Temple University School of Medicine, Easton Hospital, FlexSim Simulation Software, Greater Lehigh Valley Chamber of Commerce, Emerson, Reid & Co., Blue Cross of Northeastern Pennsylvania, Independence Blue Cross, TowersWatson, Health Planning and Assessment, The Bureau of Medicine of the Navy, FDA, CIGNA Healthcare, B. Braun Medical, Inc., Veteran Affairs Medical Center, Abbott Laboratories, Welch Allyn and Geisinger Medical Center.

For more information about the Industry Leadership Board, please visit www.lehigh.edu/ise/hse.html#ILB.

Portions of this article were contributed by Volume 1, 2012 *RESOLVE* Magazine.

ISE welcomes new Advisory Board Members

Ray Glemser '83, Barry Levine '81, and Sunil Misser '88G have joined the ISE Advisory Board within the past year.

Ray Glemser is president of Glemser Technologies in Bethlehem. Glemser Technologies is an IT consulting services firm with broad experience in all aspects of effectively automating business processes to ensure regulatory compliance, increase productivity, and reduce operational costs for the life sciences industry (pharmaceutical, biotechnology, and medical device companies).

Barry Levine is vice president and principal of Microcomputer Consulting Group Inc. in New York City. The company focuses on helping small/medium businesses by developing custom, personal computer software and utilizing small computers cost-effectively throughout the firm across many industries. Although the technology has changed, the company's focus has stayed the same to this day.

Sunil (Sunny) Misser is the chief executive officer of AccountAbility in New York City. Sunny has extensive experience working with global clients, developing and implementing solutions in the areas of strategy, structure, process, people, and systems; improving the efficiency and effectiveness of global value chains; designing and implementing enterprise-wide performance improvement solutions; and managing complex business transformations.

The department would like to thank

Autumn Bayles '92

Michael Seiden '63

Dr. Gary Whitehouse '60, '61G

Dr. Wilson Yale '73, '76G, '78Ph.D.

for their time, support, and expertise during their terms on the board.

We would like to welcome:

Richard Holtz '67

Deborah Nagel '98

George Snow '81

who joined the board in August 2012. They will be featured in the next publication.

The purpose of the ISE Advisory Board is to provide input and support for the department. This includes advising faculty and the department chair about all of its programs, students, projects, and centers and providing contributions to the department.

For more information about the advisory board, please visit www.lehigh.edu/ise/advisory_board.html.



Q&A with Stephen Senkowski '73

Past ISE Advisory Board Chair

After graduating from the department in 1973, Steve Senkowski joined Armstrong and advanced from entry-level industrial engineer. He moved through the ranks to Executive VP of Armstrong World Industries, with revenues of \$3.4 billion. He served as Executive VP from 2004 to 2009, taking on the oversight of six functional areas along with Armstrong Cabinet Products, a separate division of Armstrong, with \$240 million in sales and \$8 million in profits during his tenure. Concurrently, he served as president and CEO of Armstrong Building Products and Asia-Pacific operations with \$1.4 billion in revenues and \$240 million in profits, with 23 global manufacturing plants.

As President and CEO of Worthington Armstrong Joint Venture (WAVE), a subsidiary of Armstrong, Steve directed the grid suspension system business at the corporate office and at eight plants globally. Ultimately, he positioned WAVE to take worldwide leadership in its category through continuous innovation. Prior to being President and CEO of WAVE, he held several positions in Armstrong, including Vice President of Innovation, Research and Development, Product Design and Product Development, Building Product Operations; and General Manager, Innovation. He instituted robust new product development processes and product pipeline management and was instrumental in winning the Malcolm Baldrige National Quality Award in 1995.

Steve served as Director on the WAVE Board from 2000 to 2009 and as Chair from 2005 to 2009, when he retired from Armstrong. He also was on the Armstrong Foundation as a board member from 2003 to 2009. He sat on the National Association of Manufacturers Board of Directors as the Armstrong representative from 2005 until 2009, and as a board member of the Design Futures Council from 2003 to 2009. Steve served as the ISE Advisory Board chair and is currently a member of the Lancaster County United Way Board of Directors.

Most recently, he served as President and CEO of Xella Aircrete NA, where he developed strategic plans for long-term profitable growth, including positioning a national distribution network.

Q. Why do you feel it is important to give back to the department?

A. I believe it is important to “give back” in many ways, not just to a former academic department. Each of us continues our learning long after we leave our academic life behind. By sharing what we have experienced with others, whether that is as faculty or students, we help to accelerate their learning as well as help to engender improvement in the existing academic program.

Q. What was your deciding factor to participate on the ISE Advisory Board?

A. The ISE Advisory Board was a great way to reconnect with my academic roots at Lehigh, while at the same time providing perspective that could be useful for Lehigh.



Q. Which ISE faculty member influenced you the most?

A. Wally Richardson was the one faculty member who stood out. His stories often seemed tedious but his point was clear, and in the end, he was talking about application of the academic principles into practice. And although he was sometimes a little gruff, he always seemed available to talk when you needed him.

Q. Anything else you would like to add?

A. At some point in our lives, we all get presented with challenges or opportunities that are outside our comfort zone. If you don't try some of them, your ultimate success and sense of accomplishment will be limited.

None of us are islands in the work world, and none of us are entitled to anything because of what we have learned as proven by a diploma. We must continually prove our worth and help others create or experience value because of what we do.



Development of ISE

As the ISE department continues to work hard for continuous improvement, an ongoing excellence in all aspects of educating our students, and the performance of cutting-edge research, support from our alumni and friends is greatly needed. Your generous gift to the department will have a lasting impact on today's students and for generations to come. If you would like to make a gift, please visit mylehigh.lehigh.edu. After you enter into mylehigh, click the "Donate" box and highlight the P.C. Rossin College of Engineering and Applied Science. In the "If Other or Student club" box, please enter the ISE department.

If you are also celebrating a reunion year, you can still designate your gift to the department. If you have any questions, please contact the P.C. Rossin College of Engineering and Applied Science's development director, Maureen Rinkunas, at 610-758-6361 or at mbw202@lehigh.edu.

Reasons to Give to ISE

From Lehigh's earliest history to the present day, the generosity of alumni, parents and friends has been vitally important, supporting what is already excellent about the university and contributing to new initiatives that expand our impact on higher education and our service to the nation and the world. Gifts have an impact on every aspect of our academic mission, our research programs and our campus life.

Designating your gift to ISE has a lasting impact on future industrial engineer leaders. Below are some of the top reasons why you should designate your gift to ISE.

1. Lab and Classroom Preservation

With the newly renovated labs we currently have in Mohler Lab, gifts that enable us to maintain these prime learning and research facilities are extremely important. Keeping the computers, audio-visual equipment, classroom furniture and the manufacturing and robotics lab machines up-to-date is crucial to providing a stimulating educational experience for students.

2. Guest Speakers and Professors

Guest speakers and professors from both industry and academia provide new learning experiences for the ISE

department students. They provide a valuable educational experience and input about industrial engineering and the world for faculty, students and friends of the department.

3. Research and Program Development

Cutting-edge research that is done by our faculty and students helps shape our future. Research in our department includes simulation, optimization of healthcare systems and processes, supply chain management, financial optimization, data mining, optimization and high-performance computing. The development of innovative programs, such as Healthcare Systems Engineering, is critical to providing the best education for current and future generations of IEs and ISEs.

4. Asa Packer Society and Capital Campaigns

All gifts that are designated to ISE are counted towards the Asa Packer Society and the Lehigh Capital Campaigns.

5. ISE Legacy

Beginning the tradition and leaving your legacy to the ISE department is priceless. Designating your gift to the ISE department will leave your lasting legacy for current and future generations of students that will develop into tomorrow's leaders.

www.mylehigh.lehigh.edu

Finding fame in the world of haute cuisine

By Karl Brisseaux '11

Whitney Chen '05 has a knack for taking on challenges. At Lehigh, she was a successful student in industrial engineering, one of the university's more demanding disciplines. After graduating, she worked on construction and energy projects for Navigant Consulting in New York City.

Lately, she has focused on a new challenge: cooking.

Before a packed audience at the Wood Dining Room in Iacocca Hall this past March, Whitney spoke about her unique journey from engineer to world-class chef, TV show contestant on *The Next Food Network Star*, and food writer.

In a cooking demonstration called "Follow Your Passion," Whitney encouraged students, faculty, staff, and community members to try their hand in the kitchen. Recipes and giveaways were available at the end of the program.

Whitney has enjoyed a rapid rise to success and stardom in the restaurant world. Before she was on the show, she worked as a Chef de Partie at Thomas Keller's *Per Se*, which *The New York Times* has called the best restaurant in the city.

An abrupt change

Whitney enjoyed being an engineering consultant, but decided after four years to chase her dreams of becoming a chef. She dropped everything, moved to Maryland to attend culinary school at L'Academie de Cuisine, and completed the program in 2010. Her family and friends were fully supportive of her decision to switch careers.

"I always wanted to cook. I mean, I wanted to cook before I came to Lehigh. But my parents basically said no," said Whitney. "In the end, they were absolutely right. I would not give up my time or my degree here for anything."

Today, Whitney is a contributing editor and photographer at *Gilt Taste*, an online food magazine and shop. Her column, "Don't Sweat the Technique," shows readers how to incorporate four-star flair in their own recipes. She's also working on launching a food-focused nonprofit by the end of the year.

"The hard part about cooking is you really have to show people how to cook," said Whitney. "That's really the focus of my column, to kind of very clearly spell it out."

A self-proclaimed life learner, Whitney holds a certificate in journalism from New York University's School of Continuing and Professional Studies.

Whitney is a member of Delta Gamma sorority, and during her time at Lehigh she worked with the Lehigh University Art Galleries, among other involvements. She looks back fondly on her four years in South Bethlehem, and appreciates the lifelong bonds she formed on campus. Best of all, she says, her education in engineering prepared her for a life in the restaurant world.

"I actually think having this degree and having everything I learned at Lehigh to fall back on made me a lot more confident in being able to leave my job and go pursue something else," she said.

"I use everything I learned here, or parts of everything I learned here, every day."



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"Lehigh University's Industrial and Systems Engineering Dept" group



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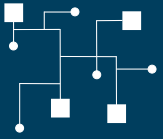


www.twitter.com/lehigh_ise



Correction:

On page 19 of the 2012 newsletter, we included the Quantum Foundation as one of the member companies. The Quantum Foundation is not one of the member companies on the Healthcare Systems Engineering Industry Leadership Board. We apologize for this mistake.



Taking graduate student projects to thrilling heights. See page 11 for the full story.

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