

### Spencer C. Schantz Endowed Distinguished Lecture Series in ISE

Dean of Engineering at MIT delivered the Inaugural Lecture



Dr. Thomas L. Magnanti

Dr. Thomas L. Magnanti delivered the inaugural lecture for the Spencer C. Schantz Distinguished Lecture Series on March 26<sup>th</sup>, 2004. Dr. Magnanti is the Institute Professor and Dean of Engineering at the Massachusetts Institute of Technology (MIT). He gave an engaging lecture on "Engineering Exuberance." He discussed the engineering achievements in the last century, and what is on the horizon in areas such as nanotechnology, bioengineering, and information technologies, and he commented on the role of systems engineering and operations research in the next generation engineering innovations.

Spencer C. Schantz graduated from Lehigh in 1955 with a B.S. in Industrial Engineering. Following progressive responsibilities with several electrical manufacturing companies, in 1969 he founded U.S. Controls Corporation and became CEO and President. Well liked by faculty and classmates alike, Spencer is remembered as gracious, affable, and a true gentleman. Although extremely successful in business, Spencer described himself as a middle-of-the-pack student. He readily credited Art Gould, George Kane and Wally Richardson as the people who truly taught him how to think. In return, he gave generously of his time, his expertise, and his material and financial resources. After Spencer passed away, his wife Jeri has been instrumental in ensuring that Spencer's gift continues his deep appreciation for the role of innovative thought in education. The Spencer C. Schantz Distinguished Lecture Series was established by Jerelyn Schantz, who, together with her late husband, sought to bring a valuable educational experience to faculty, students and friends of the Department of Industrial and Systems Engineering.

### Lehigh ISE has the first NSF IGERT Program in the IE/OR Area

IGERT is an NSF sponsored doctoral fellowship program. Lehigh ISE is the first in the IE/OR area to be awarded a multi-million dollar IGERT grant. It prepares students to become national and international leaders in global manufacturing logistics either in industrial or academic settings and to make major contributions towards "bridging the gap" between theory and practice in manufacturing logistics. The faculty participants have strong industrial ties and connections to major R&D organizations such as the Fraunhofer Institutes for Manufacturing and Logistics in Germany, and CSIRO Division of Mathematical and Information Sciences in Australia. The fellowship includes full tuition coverage, monthly stipend, and an allowance for educational expenses that will be used to cover an industrial internship at an industry R&D facility and an international internship.

### Highlight of Student Activities

**David Schweitzer** completed his international internship at the Technische Universiteit Eindhoven in the Netherlands last spring working on adding batch arrivals to a class of Markov processes with linear rates on a semi-infinite strip. He also attended a workshop on Performance Analysis of Communication Systems and presented his research at the INFORMS conference in Atlanta. David's dissertation is on multi-server polling systems, under the supervision of Dr. Andrew Ross.

**Joao Goncalves** completed his international internship in Scotland at the University of Edinburgh, where he was hosted by the School of Mathematics and worked with Dr. Jacek Gondzio (a leading researcher on interior point methods for linear programming) on improving and exploring new applications for a linear programming algorithm proposed by John von Neumann. He is continuing this research under the supervision of Dr. Robert Storer. Joao also

## Chair's Message



The past few years have been a period of great expansion and new development for the ISE department. We hired seven new faculty, all of them absolutely top notch; many of them had postdoctoral experiences from national labs or university research labs, and many have industry experience as well. In particular, I am pleased to report that two of our new faculty members are women. This is important as more than 30% of our undergraduate majors are females, and these new faculty members are great role models.

The department has continued to innovate through the development of exciting new educational and research programs, many of them in collaboration with other entities on campus and beyond. The ISE department has the first and only **National Science Foundation IGERT program** in the IE/OR area, with a focus on Global Manufacturing Logistics (GML). This is a multi-million dollar doctoral fellowship program funded by NSF's Integrated Graduate Education and Research Training (IGERT) program. During this period, the IGERT GML program will add some 25 doctoral fellows to the ISE department. The Wharton School at the University of Pennsylvania is our partner in this program. You will read from the newsletter the activities of our current IGERT students.

Another important development in the area of graduate research and education is the creation of the **Center for Value Chain Research (CVCR)** in partnership with the College of Business and Economics. The center is an outgrowth of the logistics focus in the Manufacturing Logistics Institute, with broader emphasis on the upstream value-creating process. CVCR specializes in research topics such as collaborative product development, performance metrics, and portfolio planning and optimization. The CVCR received funding to be established as an NSF research center that promotes and provides academic-industry collaborative research. In May 2003, CVCR/NSF hosted an industry workshop to further refine its research foci and future directions. Through active debate and discussion with industry representatives, the center has identified a research agenda focusing on the value chains of three main industry sectors: high-value manufacturing, pharmaceuticals, and financial services. CVCR is the first joint research center between engineering and business at Lehigh. The center is initiating active research programs with major US firms such as Agere Systems, Boeing, GM, HP, and IBM.

There are many exciting new developments in undergraduate and graduate education. Four years ago, we helped create the **Integrated Business and Engineering (IBE)** honors program at Lehigh. The B.S. degree program allows students to complete a core curriculum integrating the foundations of business and engineering, while majoring in one of the engineering or business disciplines such as industrial engineering, chemical engineering,

bioengineering, finance, or accounting. Under the leadership of ISE professor Bob Storer and finance professor Steve Buell (IE '70), the program has been a great success, consistently attracting high caliber students with high SAT's and exceptional academic achievements. The first class of IBE student will graduate this spring.

Two years ago, we created the B.S. and M.S. degree programs in **Information and Systems Engineering (I&SE)**. I&SE creates a unique niche blending methodologies in systems engineering, operations research, and computing to support a wide variety of computing-intensive applications in finance, IT, logistics, and manufacturing. As part of a university-wide "Lehigh 2020" initiative, I&SE is a main component of Information Science and Technology, a targeted subarea for significant expansion. The programs form a partnership with the Department of Computer Science and Engineering as well as the Business Information Systems Program in the College of Business and Economics to create a unique curriculum blending industrial engineering, operations research, information technology, and high-performance computing. The I&SE programs strongly complement our graduate and undergraduate Industrial Engineering Programs, adding new electives, research projects, and internship opportunities. This year, we added an honors component to I&SE, **I&SE Leadership Program**. Supported by numerous industrial firms in the region, the leadership program cultivates industrial leadership capabilities through four years of integrated honor seminars, industry mentorship, real-world problem solving, and project management. A student grows from participating in small project teams in their sophomore year, to become project leaders when they are seniors.

In the past year, we have been working hard to create a joint **M.S. degree program in Analytical Finance**. This M.S. degree program, drawing on faculty expertise from Industrial Engineering/Operations Research, Finance, Mathematics, and Economics, provides a rigorous training for quantitative-oriented students to work in the financial sector. This master's degree program is a natural extension of the Information and Systems Engineering area, which forms the methodological and computational foundations. This is expected to be a program highly sought after by students from engineering, physical sciences, mathematics, and economics. We have received valuable input from Lehigh alumni on Wall Street during the development of this program.

As you can see, with the new faculty and the new programs, this is a very exciting time for us. ISE is growing as a dynamic field and we are definitely growing as a department. We would love to hear from you; your thoughts, comments, and suggestions are important to us and will help us to direct our future steps. Please feel free to write to me, email me at david.wu@lehigh.edu, or stop by to visit us.

S. David Wu  
*Lee A. Iacocca Professor and Chairman*

# IGERT Student Activities

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gave a talk at the University of Edinburg and at the International Workshop on Computational Management Science, Economics, Finance and Engineering in Cyprus.

**Matt Galati** plans to defend his dissertation at the end of the spring 2004 semester. His work, supervised by Dr. Ted Ralphs, is on a general separation algorithm for large-scale discrete optimization problems using decomposition methods. Matt has also accepted a position as an 'Optimization Developer' with SAS Institute to start April 2004. Matt has worked with IBM Service Parts Solution on the Neighborhood Project, helped create and monitor a new ISE course: IE 170 Algorithms in Systems Engineering, and conducted a laboratory seminar series to teach software optimization tools from the COIN-or suite. In addition, Matt was invited to give a talk at the Mathematics Department at Ecole Polytechnic Federale de Lausanne (EPFL) in Switzerland at the IBM-Swiss Workshop on Operations Research and at the CORS/INFORMS Conference in Banff, Canada in May 2004. He also presented his research at the ISMP meeting in Copenhagen, Denmark.

**David Drake** is currently working on his dissertation under the supervision of Dr. Robert Storer on the Dynamic Vehicle Allocation (DVA) problem faced by trucking and container shipping companies. He is using adaptive dynamic programming with multi-dimensional value function approximations and heuristics to find approximate solutions to very large, stochastic, real-world logistics problems. David is currently spending his international internship at the Hong Kong University of Science & Technology being advised by Dr. Raymond Cheung.

**Jennifer Rogers** spent the fall semester studying at the University of Edinburg, Scotland for her IGERT international internship. She worked with Dr. Joseph Hartman in the Management School and developed a dynamic programming model for a replacement economy problem which was solved with simulation. Jennifer is continuing her research and will attend the IIE/IERC Conference in Houston in May to present a paper she wrote with Dr. Hartman, "Equipment replacement with continuous technological change and uncertain breakthroughs."

**Clara Novoa** did her international internship during the summer 2002 in Germany at the Fraunhofer Institute for Material Flow and Logistics (IML) and presented a paper about Ant Colony systems for sequencing traversing cars on a warehouse at the IIE Conference in May 2003 at Portland. She is currently doing her Ph.D. research on the stochastic vehicle routing problem (SVRP). She studied the single-vehicle problem under an approximate dynamic programming approach specifically using a rollout procedure. She also found two ways of reducing the tour lengths by replacing the one-step look ahead approach: by a two-step look ahead approach and by giving as input to the rollout procedure the exact solution of a capacitated VRP instead of starting with a heuristic solution.



She will be coding the solution for a multiple VRP under the dynamic approach and solving the static and stochastic multiple VRP under a column generation approach to compare with the dynamic approach.

Eight new IGERT students were added into the program in August 2003, and six more will start in August 2004.

## Joe Hartman Appointed the Kledaras Professorship

During the founder's day ceremony, ISE Professor Joe Hartman was appointed the Soteria and George N. Kledaras endowed chair. This is a seven-year endowed professorship given to a distinguished member of the faculty. Hartman is the youngest faculty ever awarded an endowed professorship at Lehigh. Hartman is a well-known researcher in engineering economy and replacement analysis; he was recently appointed the editor-in-chief of *The Engineering Economist*. George N. Kledaras is a loyal Lehigh Alumnus; he received his BS in Electrical Engineering from Lehigh in 1987, and an MS in Mathematics from the Courant Institute at NYU in 1996. Kledaras has a very successful career on Wall Street. He is currently Chairman and CEO of Kledaras Technologies Inc., which he founded in January 2003. In 1996, he founded Javelin Technologies Inc., and as Chairman and CEO led the company to become the dominant leader in electronic trading messaging software. In April 2002, Javelin was acquired by NYFIX Inc. for \$55MM. Javelin is a pioneer implementing industry standard electronic protocols and was ranked first place in Deloitte and Touche's fastest fifty growing New York City area companies in 2001. Kledaras is a strong supporter of various activities at Lehigh and especially to the ISE department. He helped to establish the M.S. in Analytical Finance program (an ISE-Finance joint program) and he sponsored numerous I&SE student internships with Wall Street firms.



## ISE Professor Bob Storer Co-Directs the IBE Honors Program

### CHOICES

Since the fall of 2002, Dr. Rosemary Berger has been the faculty advisor for the Lehigh University Student Section of the Society of Women Engineers (SWE). One of SWE's major activities for the year is CHOICES, Charting Horizons and Opportunities in Careers in Engineering and Science, which was held this year on March 25, 2004. CHOICES is an outreach program, sponsored by SWE and RCEAS, in which 60 middle school girls from the Lehigh Valley spend one day at Lehigh engaging in hands-on activities that illustrate basic principles of science and engineering. This year, the activities included (1) the Bridges Experiment in which students learn about compression and tension, build truss bridges using common materials and test the ability of the bridges to hold a given weight, (2) the Funny Putty Experiment in which students are introduced to colloids and make and investigate the behavior of Funny Putty, (3) the Asphalt Cookie Experiment in which students learn about composites, make "asphalt" cookies from edible ingredients and test the strength of different combinations of ingredients and (4) the Egg Drop Competition in which students design and build an apparatus, with a limited budget for purchasing materials, to protect an egg in a 30 foot high fall. To quote Dr. Berger's enthusiasm for working on this program she says, "The program always is fun for both the participants and the Lehigh volunteers!"

A fundamental understanding of business, technology, and how they fit together will be a prerequisite for success in the future global economy. Lehigh's Integrated Business and Engineering Honors Program (IBE) is designed to provide students with this essential perspective. The program is co-directed by ISE Professor Bob Storer and Finance Professor Steve Buell.

The IBE Honors Program addresses the constantly changing realities of the new industrial and professional marketplace: rapid technological innovation; diffusion and obsolescence; emergence of new standards; short product life-cycles and decaying margins due to increased global competition; and outcome-focused development and delivery of new products and services. Organizations now seek new forms of competition based on cooperation, often pooling physical and intellectual resources to speed up the profitable design, development, manufacturing and delivery of products and services. These changes in the marketplace demand new capabilities, which can only come with the combination of technology and commerce.

The hallmark of this integrated program will be graduates with a unique set of skills and competencies. IBE graduates will have combined engineering knowledge with business skills and detailed business tools with a keen awareness of technology issues.

There is a freshman workshop in which all IBE students participate. The object of the workshop is to develop innovative toys or sporting goods, and it is directed by Professor Ochs and Watkins. The National Collegiate Inventors & Innovators Alliance (NCIIA) hosts an annual contest. This contest allows for the top inventors to receive \$15,000 funding in order to continue development with their idea. These top 15 groups are then invited to present their products.

This year, the senior IBE group from Lehigh University that was invited to California to present their product included Adam Kornfield, Jonathan Hjelte, Cory Mingelgreen, and Mike Casarella.

This program also includes a Senior Capstone Design course, which spans two semesters. Senior IBE students work with small start-up companies in the Lehigh Valley area. These students become key employees at these companies, using valuable marketing and engineering skill in order to bring the companies' products into the market.

An example of one of these companies is a group called CDG Technology, a Bethlehem, PA based company specializing in the production of pure Chlorine Dioxide gas that is used nationally for water treatment and decontamination. They are working to decrease the company's product costs and make its system more appealing by redesigning the equipment used to dispense the gas.

## ISE Added Seven New Faculty

The ISE Department at Lehigh University has been experimenting with novel approaches in selecting, interviewing and hiring new faculty. Professor candidates are asked to prepare a lecture and demonstrate their teaching abilities in a selected course. This allows the current faculty to get a flavor of the candidates' teaching style, and permits students to evaluate the candidate based on several different areas of interest, such as subject knowledge, clarity, etc.

Seven new faculty members were added to the department in the past four years. Their backgrounds and current research interests are listed below. This is an exciting time in the department with a multitude of fresh ideas and research possibilities.

### **Rosemary Berger** Ph.D. Northwestern

Prior to joining Lehigh, Dr. Berger worked for five years in the telecommunications industry, first at U S WEST Advanced Technologies and most recently at Level 3 Communications. As a technical staff member, she applied operations research techniques to solve network engineering problems and developed optimization-based decision support tools to improve operational efficiency and corporate decision-making.

One of Dr. Berger's main research interests is telecommunications network design. One project in this area that she completed recently focused on the design of access networks for long-distance telephone companies. Recent changes mandated by the FCC in the structure of access rates have created opportunities for long-distance companies to better manage access costs. Her co-author, S. Raghavan from the University of Maryland, and she developed a novel solution approach to designing access networks that incorporates the stochastic aspects of traffic variability into a difficult discrete facility location model. The paper entitled "Long-Distance Access Network Design" appears in the March 2004 issue of *Management Science*. Also, the paper won second place in the 2003 paper competition sponsored by the Junior Faculty Interest Group (JFIG) of INFORMS.

Dr. Berger is working with Zeliha Akca, a second year Ph.D. student, on a difficult problem in supply chain network design. They have developed a large-scale integer programming model for the problem of simultaneously deciding where to locate facilities, how to assign customers to facilities, how to sequence customers on routes and how to assign routes to vehicles subject to capacity and time constraints. This summer, Zeliha will be preparing her Ph.D. research proposal.



### **Jeff Linderoth** Ph.D. Georgia Tech

Postdoctorate: Argonne National Lab  
Professor Linderoth's research focuses on modeling and solving real-world, large-scale optimization problems. His research places a particular emphasis on developing high-performance, distributed optimization software. Dr. Linderoth's most recent interests are in



the area of Stochastic Programming, used for decision making under uncertainty.

In 2002, Dr. Linderoth was awarded the SIAM/Activity Group on Optimization Prize for his work in solving large-scale quadratic assignment problems. This past year, Dr. Linderoth and Stephen Wright from University of Wisconsin-Madison were recognized with the 2003 COAP Best Paper Award for "Decomposition Algorithms for Stochastic Programming on a Computational Grid," appearing in the journal *Computational Optimization and Applications*. In the summer of 2004, Dr. Linderoth will give a plenary lecture at the Conference on High Performance Algorithms and Software for Nonlinear Optimization, in Ischia, Italy, and he will appear on a discussion panel on the topic of "Cyberinfrastructure for Optimization" at the International Conference on Continuous Optimization, in Troy, NY.

Professor Linderoth is currently working with three Ph.D. students. Jerry Shen works with Dr. Linderoth on extending grid-enabled algorithms to multistage stochastic programming. Wasu Glankwamdee recently completed a Master's thesis on computational integer programming and will stay to pursue his Ph.D. with Dr. Linderoth. Kumar Abishek has just started working with Dr. Linderoth on the study of a polyhedron related to vehicle routing. Additionally, Dr. Linderoth is collaborating with Dr. Berger, Dr. Storer, and IGERT student Clara Novoa on stochastic vehicle routing problems.

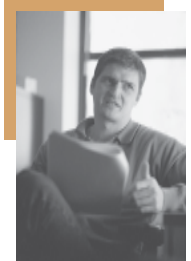
### **Eugene Perevalov** Ph.D. UT Austin Postdoctorate: Harvard, MIT

Dr. Perevalov's research activities fall into three areas: modeling and analysis of wireless ad hoc networks, product portfolio management, and dynamic optimization and its applications.

Modeling and analysis of wireless ad hoc networks: Ad hoc networks represent a promising new technology in communications. The development of such networks is still in its initial stage with only one existing example. Because of this, there are a lot of open conceptual questions associated with main principles of design of future ad hoc networks. Of particular interest is the problem of information capacity of ad hoc networks and its dependence on the nodes mobility.

Product portfolio management: Companies in today's semiconductor industry, faced with a quickly changing environment and large variability of demand, are starting to feel the need for analytical tools designed to help them in selecting and maintaining superior product portfolios. The main goal of this research is to identify the main principles of efficient product selection in the presence of massive uncertainty and use them to develop practical algorithms for optimal selection of new and discontinuation of existing products.

Dynamic optimization: This area of research deals with optimization in time dependent systems. The goal is to find the optimal solution for every time moment in a certain interval. The focus of this research is on application of various dynamic optimization methods to practical problems such as parallel processor allocation and packet routing in information networks.



**Ted Ralphs**  
Ph.D. Cornell

Postdoctorate: Rice

Dr. Ralphs' research focuses on the solution of large-scale discrete optimization problems arising in a number of application areas.

His work spans both theoretical and applied aspects of discrete optimization, attempting to bridge the gap between the two. By bringing the tools of polyhedral theory together with those from computer science, he develops practical algorithms for solving real-world problems.

His current research focuses on branch, cut, and price algorithms. These algorithms use a divide-and-conquer approach to solving difficult optimization problems. This approach lends itself well to parallelization because the algorithm naturally divides the problem into easier subproblems that can be solved independently on separate processors. The recent popularity of this approach led Dr. Ralphs to develop a software package called SYMPHONY, which provides a framework for solving a vast array of discrete optimization problems using parallel branch, cut, and price. This software has been used to solve such problems as the Vehicle Routing Problem and the Airline Crew Scheduling Problem, two classical combinatorial optimization problems. For more detailed information on Dr. Ralphs' research, please visit his personal site or [BranchAndCut.org](http://BranchAndCut.org).

Before coming to Lehigh, Dr. Ralphs was an officer in the U.S. Air Force and then a postdoctoral research associate in the Computational and Applied Mathematics Department at Rice University. In the Air Force, Dr. Ralphs worked first in the field of manpower management and then later became Chief, Tactics and Test Analysis for the 422nd Test and Evaluation Squadron at Nellis AFB. As the lead analyst for the squadron, he was responsible for overseeing data analysis and developing analytical tools to aid in testing Air Force aircraft and weapon systems in simulated combat. This work involved problems in the design of experiments, resource allocation, and statistical analysis.

Along with some colleagues at Clemson University, University of Pittsburgh, and Simon Fraser University, Dr. Ralphs recently participated in the formation of the COIN-OR Foundation, a non-profit research foundation whose object is to promote and support the development of open-source software tools for operations research. Dr. Ralphs' role in this organization will be to serve on the foundation's initial board of directors.

In April 2003, Dr. Ralphs received the inaugural "Lehigh Engineering Ingenuity Award for Exceptional Accomplishment in Teaching and/or Research for Junior Faculty".

Two of Dr. Ralphs' Ph.D. students, Matthew Galati and Yan Xu, recently accepted jobs at the SAS Institute in Cary, NC. They will be involved in developing a new suite of optimization tools that will be integrated into SAS products. Yan Xu also won first prize in an international programming competition.

In June, 2003, two of Dr. Ralphs' masters students started work at MarketRX, a consulting firm that specializes in pharmaceutical marketing.

**Andrew Ross**  
Ph.D. UC Berkeley

Dr. Ross's research comes from telecommunications applications, where the arrival rate of telephone calls, and their average length, varies according to the time-of-day. In particular, call centers such as



Emergency 9-1-1, airline customer service, and technical support hotlines try to schedule their workers to meet the demand that incoming calls create. A similar application is in designing modem banks, where again the arrival rate varies. However, the number of modems does not change throughout the day, as the number of customer service agents does. Another problem is that the design of the call center or modem bank must be done according to a demand forecast, rather than knowing the actual demand. Standard stochastic models of call arrivals (Poisson processes with time-dependent rates) do not account for all of the variability we see in actual call arrival data. Dr. Ross is working on matching better stochastic modelling of call arrivals with queueing system design, so call centers and modem banks can be designed to account for the uncertainty in the forecast. A part of this research involves processing large industrial databases of call histories, and another part is simulating the systems in question.

Dr. Ross has also done research on structuring electric power markets to ensure that solutions to optimal power flow (OPF) mathematical programs do not violate common technical constraints, such as transmission capacity and generator output ramp rates, while trying to achieve as much efficiency as possible under the circumstances. He is also working on a new phenomenon in call duration distributions due to idle timeouts in modem banks. He will be presenting research at a conference in Banff, Canada, that is run by INFORMS and the Canadian Operations Research Society (CORS).

Currently Ross is advising two Ph.D. students, David Schweitzer and Rui Kang. David is working on wireless networks, and more specifically he is working a multiple-server pulling system based on multiple tokens. Rui Kang is currently working on retrial queuing systems. Some future interest to Ross would be to collaborate with a colleague from Rutgers. The research will be focused on theoretic freeway traffic modeling.

Professor Ross won the 2004 ISE Faculty of the Year award, a departmental award given by the students.

**Lawrence Snyder**  
Ph.D. Northwestern

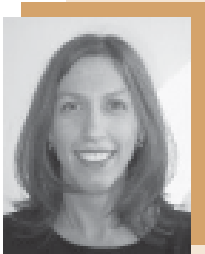
Dr. Snyder studies optimization problems in supply chain management, logistics, and facility location. His current research focuses on optimization under uncertainty, particularly when parts of the system may fail or are otherwise unreliable. Such problems have gained increasing interest in recent years as companies and organizations struggle to build and maintain supply chains that are resilient to disruptions due to weather, labor actions, or sabotage. Dr. Snyder is interested in all aspects of the modeling process, including model development, solution methodology, GUI implementation, and managerial decision-making.

Dr. Snyder has worked as a supply chain consultant at Motorola and LogicTools, a software company based in Chicago, and has participated in transportation and supply chain projects for producers of both perishable and durable goods.

Current topics in which Dr. Snyder is doing research are Inventory Models with Unreliable Suppliers and Multi-echelon Inventory Models with Disruptions. Research from the former of the two will be presented at a Manufacturing and Service Operations Management (MSOM) convention in the Netherlands in the summer of 2004.

Dr. Snyder also won an award for honorable mention for a 2003 dissertation competition. It was co-sponsored by UPS and a subdivision of INFORMS.





## Aurélie Thiele from MIT Joining the Department

Aurélie Thiele is the newest addition to the ISE faculty. She will join the department in fall 2004. Aurélie is completing her Ph.D. at the Massachusetts Institute of Technology (MIT) in 2004. She received her M.S. in Electrical Engineering and Computer Science from MIT in 2000, and she received her Diplôme d'ingénieur from Ecole des Mines de Paris, in Paris, France. Aurélie was the first-prize winner of the INFORMS Nicholson student paper competition in 2003, the most prestigious student award in the field of operations research (OR). Professor Thiele's research area is in the interface of mathematical programming, stochastic systems, and control theory. The research seminar she presented during her visit to the department was extremely well received by the faculty and graduate students. Moreover, as demonstrated by the teaching seminar she has conducted at Lehigh, her undergraduate teaching ability is equally strong. Aurélie will play a pivotal role in the Information and Systems Engineering emphasis in the department in support of activities in stochastic optimization, supply chain logistics, and applied probability. Her expertise will support ISE's interaction with Computer Science and Engineering in the areas of computing, networking, and discrete mathematics, as well as the collaboration with the College of Business and Economics in Value Chain Research. She will support undergraduate courses in probability/statistics and operations research, and graduate courses in dynamic programming, nonlinear optimization, revenue management, and financial engineering.

## Undergraduate Updates



As always, the students that make up the undergraduate classes of the department are involved, enthusiastic and successful. While coping with classes like Simulation, Operations Research, and Engineering Economy, the undergraduates still find time for extracurricular activities. Current IE seniors can be seen scoring goals on the lacrosse field, winning races with the crew team and making birdies on the golf team. Off the playing field, IE's are involved in producing shows at Zoellner Arts Center and singing in acappella groups.

Within the department, the Institute of Industrial Engineers had a rebuilding year, as the organization's previous advisor, Professor Hartman, was on sabbatical in the fall of 2003. Taking the reins, Professor Tonkay is currently steering a new energetic group of officers. President Pamela Lewis and officers Christine Canfield, Michael Mooney, Ellianna Lam, Helen Roche and Vincent O'Reilly organized meetings, got the budget under control and arranged factory tours. This year's highlight was Yuengling Brewery in Pottsville, PA. More than forty students and faculty visited America's oldest brewery. The group investigated the brewery, the bottling facility, and the plant's own wood-carved bar.

Another trip sponsored by IIE was to Portland, OR. Shane Cloyd, Jonathan Gardenier and Kate Lausch were nationally selected to represent Lehigh University at the 9<sup>th</sup> Annual IIE/Rockwell Software Simulation Contest. Under the advisement of Professor Hartman, the team flew out to Portland and took fourth place in the competition.

Current undergraduates have earned impressive co-ops at Disney, UPS, Carpenter Steel and Kraft. After this upcoming graduation, current seniors will be working at UPS, Mercedes, Ingersoll-Rand, Accenture, Lord & Taylor, Black & Decker and JP Morgan & Chase. IE undergrads are among the best on campus and their hard work will surely pay high dividends as they become Lehigh alumni.





## Industrial and Systems Engineering

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## We'd Like To Hear From You:

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