

Industrial and Manufacturing Systems Engineering Department



LEHIGH
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Spring 2001

Chair's Message

I am pleased to share with you some exciting news of the Industrial Engineering Department from the past two years. Among other things, we are



changing our name to the **Department of Industrial and Systems Engineering**. We are in the process of launching a B.S. and an M.S. degree programs in **Information and Systems Engineering** (in addition to the IE degrees we currently offer) and we expect to expand the scope and the faculty size of our department by a significant margin in the next five years.

First, I will update you on the personnel in the department. In October 1998, our former chair, Louie Martin-Vega, took on an opportunity at the National Science Foundation, where he is now the Acting Assistant Director of Engineering (the person in charge of all research funding in engineering). I first served as interim chair in 1998, and then appointed department chair since August 1999. Sadly, in March 2000, Professor G. Sathya passed away due to a massive heart attack. At the time of this sudden event, he was on sabbatical leave at Indian Institute of Science. Sathya's death is a great loss for the department and the IE community. The department has prepared a memorial booklet for him, which includes tributes and letters from former colleagues and students. Please contact Rita Frey at the IE office for a copy.

On a happier note, in fall 2000, we successfully recruited Professor Ted Ralphs as the newest addition of our faculty. Ted joined us as a postdoctoral fellow from Rice University. He received his Ph.D. in Operations Re-

search and Industrial Engineering from Cornell. His specialty is in computing, optimization, and parallel algorithm development. He has created the software system SYMPHONY, which is capable of solving large-scale optimization problems such as vehicle routing, scheduling, and logistics using parallel computers. In addition to Ted, we have recruited Dr. Elaine Chew from MIT as a visiting professor during 2000-2001. Elaine has a unique background blending operations research and music theory. She is also an accomplished concert pianist who gave more than three concerts at the Zoellner Art Center since arriving at Lehigh. Besides teaching undergraduate OR and Probability classes during her visit, she has contributed a great deal to the campus life. This year we are recruiting two additional faculty to join the department academic year 2001-02. Their areas of expertise are expected to support the department's new focus in information and systems engineering.

In the past year, the IE faculty received significant professional recognitions both here on campus, and in the profession. Professor Robert Storer was appointed as co-director of Lehigh's Integrated Business and Engineering (IBE) Honors Program, a recently launched program lead and designed by IE faculty members. Professor Martin-Vega received the Hispanic Engineer of the Year Award and the Holzman Distinguished Educator Award. Professor Groover received the SME education award, Professor Zimmers became a Fellow of SME, and Professor Hartman received the ASEE Eugene L. Grant Best Paper Award, just to name a few. On the research front, the department leads a \$2.7 Million, 5-year NSF IGERT doctoral fellows program in **Global Manufacturing Logistics** in partnership with the Wharton School at Penn. More than thirty doctoral fellows will join the IMSE Ph.D. program over the next five years through the IGERT fellows program (an additional ten will join Wharton).

In the article "Moving IE to the Information Age," I am giving you an outline of the direction in which the department is moving. The outlined program is the outcome of many discussions over the past two years among the faculty, with the IMSE visiting committee, with alumni and friends, and with university administration. This general direction will shape our future, and will form the basis of our expansion in faculty size and in departmental scope. I would like to invite your comments and suggestions, as well as your support, which I believe will further shape our thinking, and help our long-term development. Please feel free to drop me an email (david.wu@lehigh.edu), give me a call (610-758-4050), or write to me.

S. David Wu
Professor and Chair

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IMSE

Presidential Scholars

President's Scholars Gear Up for a Year of IE

Seven Lehigh Engineering graduates undertook graduate work in the Industrial Engineering Department this year without paying a dime. These students earned the right to become President's Scholars. They did so by obtaining a minimum cumulative Grade Point Average of a 3.5 after 90 Lehigh credits or by receiving a Lehigh baccalaureate degree with High or Highest Honors. Now they have a free year at Lehigh to pursue graduate work or make a concentration in undergraduate work.

Two graduating Industrial Engineering students will be remaining in the department for one more year. Jose Arimany and Mereille Najm will both pursue a Master's Degree in Management Science.

The Industrial Engineering department's graduate program also attracted students from other engineering disciplines. Chemical engineering graduates, Justin Ondrey and Ulana Chabon will be working on their Masters in Management Science. Justin has an interest to work in Pharmaceutical Manufacturing while Ulana has plans to work for Merck and earn her Masters in Business Administration (MBA). Civil Engineering graduate Megan Calhoun will be pursuing a Masters in Management Science. Computer Engineering graduate Nicole Rivera and Electrical Engineering graduate Michael Troup with both be pursuing a Master of Engineering in the Industrial Engineering Department.

These students have one year following the awarding of their baccalaureate degree to complete their studies under the President's Scholarship.

Alumni Wilson Yale Recognized for Outstanding Support

At a university recognized for strong alumni support, Dr. Wilson W. Yale continues the tradition by giving student experience with real world situations. Wilson, a Senior Vice President at Morgan Stanley Dean Witter, has been providing two to three projects a semester to student teams usually consisting of three senior IE students. These projects vary from emerging applications to analysis of financial trends and investment alternatives. Students who have worked on such projects found them both interesting and useful.

Dr. Yale has numerous academic achievements. To list a few, he has obtained a Ph.D. in Industrial Engineering, a M.S. in Management Science and Computer Science, and a B.A. in Mathematics. Besides his academic achievements, he also acquired Morgan Stanley Dean Witter certifications in Restricted Securities and Cashless Options and Retirement Planning. After successfully completing a senior consultant program conducted jointly by MSDW and The Wharton School of the University of Pennsylvania, Dr. Yale became a Senior Consultant, and an instructor for the Wharton/MSDW Senior Consultant course. In 1995, he became a Certified Investment Management Analyst (CIMA) by the Investment Management Consultants Association.



His dedication to the community is also remarkable. Wilson is heavily involved with the Allentown Rotary club where he sits on the Board of Directors as well as the Private Industry Council of the Lehigh Valley Inc. where he also holds a seat on the Board. These are just a few of the things Mr. Yale has accomplished yet he still managed to raise three sons with his wife Donna.

Dr. Wilson Yale was recently honored for his outstanding support to the university. He was invited to participate in a ceremony in which he was presented with a plaque in recognition for his constant and selfless support. In this picture he appears with Dean J. Chen, and Marc Collins, Tais Vasconcellos, and Thomas Sennett, three senior IE students. Lehigh and especially the Industrial Engineering Department and its students are grateful for all the Wilson has provided. His dedication and commitment to education and hard work provide an excellent example for everyone and Lehigh is proud to have his support.

Dr. Emory Zimmers Honored at Banquet

Dr. Emory W. Zimmers, Jr. was voted the recipient of the Outstanding Teacher Award 2000 by Industrial Engineering seniors. The award was presented at the IE Annual Spring Banquet by



Cristina Henry, treasurer, and Jess Wise, president of the Lehigh student chapter of the Institute of Industrial Engineers. The banquet was held on Tuesday, April 18, 2000, at the Radisson Hotel in Bethlehem.

This was the fourth time that Dr. Zimmers was recognized during the 1990-1999 decade! Dr. Zimmers is always actively working with industrial and government partners, as well as with other IE departments and Lehigh professors, to find better ways to educate engineering students. He is continuously spearheading innovative educational initiatives at the Enterprise Systems Center such as student-run companies and the Enterprise Learning Collaboratory. Dr. Zimmer's activities in these areas are a significant example of how faculty members at the IE department and the P.C. Rosin College of Engineering are working closely aligned with the agenda and goals advanced by the board of trustees, President Farrington and Provost Markley. Clearly such activities are a determined action to assume a leading role in inventing what it means to be a university in the digital age, invent

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IE Department Welcomes Two New Professors

The Industrial Engineering department at Lehigh University embraces the chance for change and improvements as we welcome two new Professors to the faculty: Elaine Chew and Theodore Ralphs.

Elaine Chew, the department's new visiting assistant professor, joined the faculty in September of the year 2000. She received her Ph.D. from Massachusetts Institute of Technology. Dr. Chew's research interests are in mathematical modeling and algorithm design for computational approaches to pattern-recognition problems. These problems occur in information retrieval, artificial intelligence, robotics, molecular biology, finance, the cognitive sciences and other types of data analysis. Dr. Chew's teaching interests include Nonlinear Optimization and Mathematical Programming, Applied Probability and Statistical Analysis, Decision Analysis and Engineering Economics. This semester at Lehigh she is teaching Applied Engineering Statistics and she also is the supervisor of a one credit Software tools lab.

Her Ph.D. thesis combined her expertise in operations research and in music (she is also an accomplished pianist), which focused on a geometric representation for re-conceptualizing relationships in western tonal music, thus facilitating practical algorithm design for fundamental cognitive problems in music analysis. The algorithms employed techniques rooted in mathematical programming.

Dr. Ralphs' research focuses on the solution of large-scale discrete optimiza-

tion problems, especially those based in logistics. His work spans both the theoretical and practical 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 work is on so-called 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 branch, cut, and price.

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.

Banquet Awards

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ing new and more effective teaching methods, and being a wise steward of resources and a strong regional partner.

The keynote speaker was Jeff Luker, a Lehigh graduate. Jeff shared insights and perspectives from his time at the IE department. Other outstanding members of the IE community were recognized at the

banquet. The faculty voted Jason Rosenfeld, president of Alpha Pi Mu, the Outstanding Senior for his initiative and service spirit. Anthony Hillman, the current president of the Lehigh Student Chapter of the IIE, was voted as the Outstanding Junior, while Jianbiao Pan was selected as the Outstanding Graduate Student of the Year.

Dr. Elaine Chew
Favorite Activities/
Hobbies: playing
chamber music
Favorite Book(s):



"Godel Escher, Bach: an eternal Golden Braid" by Douglas Hofstadter
"The Restaurant at the End of the Universe" by Douglas Adams
"Tigana" by Guy Gavriel Kay
Favorite Movie(s):
"The Usual Suspects"
"Burnt by the Sun" by Nikita Mikhalkov
"Blue" from Kieslowski's trilogy
Hometown: Singapore
Adventures I have survived: Climbing Half Dome in Yosemite National Park, Sea-kayaking off the West Coast of Vancouver Island, Tubing on Cranberry Mountain in New Hampshire
If I had \$20,000 to spend in one week: Shop for a second-hand grand piano, of course!

Dr. Ted Ralphs
Favorite Activities/



Hobbies: Hiking, cycling, skiing, camping, backpacking, canoeing, or anything else outdoors, Traveling/Adventuring, Photography, Home-brewing
Favorite Book: Tuesdays with Morrie
Favorite Movie: Spinal Tap
Hometown: Hatfield, PA (Home of the Smiling Porker)
Cool things I've done: Seeing new places and experiencing new things is one of my favorite pastimes. I've been just about everywhere there is to go in the U.S., including Alaska (Hawaii is this summer). I've also spent a lot of time traveling in Europe and have made one trip to Central America. I plan on visiting Asia in August. In the summer of 1999, I rode my bike from Seattle, WA to Washington, DC and raised \$8000 for the American Lung Association. The coolest experience I've ever had was flying in an F-16 a couple times when I was in the Air Force.
If I had \$20,000 to spend in one week: I would go on a fantastic trip...maybe hire a guide and head to Antarctica or the North Pole...or maybe circle the globe, hitting all seven continents...or maybe try to climb Everest.

Moving IE Into the Information Age

— by S. David Wu

Lehigh Industrial Engineering has always been recognized as a solid program with a strong emphasis in manufacturing processes and systems. However, as an academic department we must go through continuous renewal in order to provide relevant and high quality educational training to our students. Our proposed renewal follows major trends of the industry and the evolution in the field of Industrial Engineering. Over the past thirty years, Industrial Engineering went through major evolutionally changes. The earlier development of IE focused on improving mechanical systems and processes, rooted in manufacturing and materials science. The scope of IE grew over the years as U.S. industry turned its attention to scientific approaches to management, and later the adoption of systems methodologies such as simulation, modeling, quantitative and computational analysis for the purpose of continuous efficiency improvement. From the 1970's to the 1990's these methodologies have been successfully transformed from manufacturing processes, to plants, to enterprises, to supply chains, and to service organizations. It is now commonplace to see banks, hospitals, airlines, venture capital firms, and transportation/logistics organizations make use of the systems methodologies for planning, business analysis, and running their core business. This trend is clearly reflected in student placement records, where more than 60% of our students now start their career in the service economy. While the transition from the **manufacturing** to the **service** sector continues, the next critical phase of transition for industrial engineering is to embrace the rapid development of **information science and technology**. The transition will be vital for the education of our students, for the continuous growth of faculty research and scholarship, and, we believe, justifies significant adjustments in our academic programs.

Why Information and Systems Engineering?

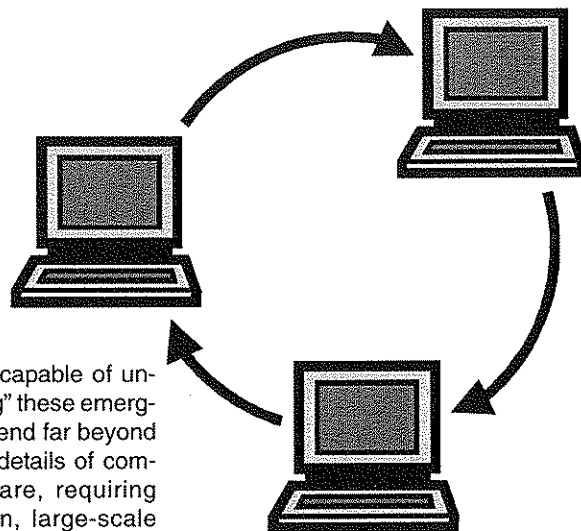
New communications technologies, the web and recent advances in computing are profoundly changing the nature of business and industry. The increasingly complex intertwining of organizations coupled with continued automation of business pro-

cesses creates new and complex large-scale systems of enterprises, people, capital equipment and information. With these changes comes the need for people capable of understanding and "engineering" these emerging systems. The needs extend far beyond expertise in the micro level details of computer hardware and software, requiring instead systems integration, large-scale optimization and control, and knowledge of the operations of industry. These needs are consistent with the traditional skills of Industrial Engineers. The department is in an ideal position to move quickly toward establishing a national presence in this area of critical importance based on our current strengths.

What do we mean by "Information and Systems Engineering"?

Goals of the Academic Programs: To pursue basic understanding of the complex facets of modern information technologies and systems, and their implications in industrial, service, and financial enterprises. Three areas of concentration are defined as follows:

Information Economics: To study the formulation, structure, and operational dynamics of information-centric systems in the context of industrial organizations, service sector economics, and financial institutions. Topic areas range from fundamental theory and methodologies in systems science and engineering, to issues in complex supply networks, e-Business, electronic marketplaces, and financial engineering. This area of concentration is based on the solid **foundations of science and economics** through which we envision the long-term development for, and the profound implications of modern information systems. Education and research collaboration with the College of Business and Economics is expected. The CBE group brings expertise in various business contexts, while the industrial engineering group provides the science-engineering perspectives with analytical and statistical tools, and an intimate knowledge of large-scale industrial and service organizations. Research collaboration outside the Lehigh campus is to be expected. Current linkages to top U.S.



and international institutions via the NSF IGERT program in Global Manufacturing Logistics provide strong synergistic support for this area of development.

Quantitative Systems Analysis: To study operations research and computational tools for analyzing complex systems and their information components. Topic areas include mathematical programming, optimization, decision analysis, large-scale modeling and simulation, decentralized decision processes, stochastic processes, sequencing and scheduling, parallel and distributed algorithms, and algorithm design. This area of concentration forms the **methodological base** for the design, integration, implementation, and management of information systems in large-scale organizations. Relying on a strong base in mathematical and computing techniques, this area has strong synergy with the department's existing strength in logistics and operations research. Similar to the Information Economics area, strong research collaboration outside the Lehigh campus is to be expected. The department's IGERT doctoral fellows program provides strong synergistic support.

Information Technology and Applications: To study computer and communication technologies needed to design and implement information system applications. Of specific focus will be the **applications** of information technology in manufacturing and business environments, including electronic commerce, supply chain and enterprise information systems, manufacturing information systems, and intelligent manufacturing control. This area concentrates on the **technological** aspects of modern information systems such as database sys-

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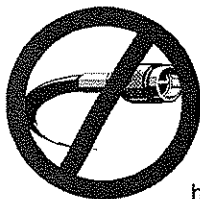
Mike Groover Wins Award

Mike Groover, professor of IMSE, has been named winner of the SME (Society of Manufacturing Engineers) Education Award, which he will receive at SME's annual awards banquet in June in Seattle.



SME is an international organization representing manufacturing professionals with a membership of 52,000, mostly in the United States. Groover, who will receive one of seven international honor awards from SME, is being cited for "development of manufacturing-related curricula, fostering sound training methods, [and] inspiring students to enter the profession of tool and manufacturing engineering."

In the last 20 years, Groover has written or co-written six textbooks, including one in second edition, on the topic of manufacturing, that have been used widely in the U.S. and throughout the world. They have been translated into Chinese, French, German, Japanese, Korean, Portuguese, Russian, and Spanish. Some of Groover's books were the first textbooks published in their subjects, including texts on automation and production systems.



Wave of the Future: Wireless Classrooms

Lehigh University's Mohler Laboratory is expanding upon the number of rooms it currently has by adding an additional classroom. However, this isn't just your typical everyday classroom. Lehigh University's Mohler Laboratory is embarking on the wave of the future with a new wireless classroom. Instead of the traditional classroom where students painstakingly take notes of the professor's lecture by copying his blackboard scribbling, Lehigh has converted to this new type of classroom.

The new wireless classroom — a room where computers operate off radio waves instead of electricity — is part of a pilot project Lehigh has embarked on this fall. The new arrangement enables laptop computers to be turned on and connected to the Internet without being attached by cables to electrical outlets and modems. The laptops can be moved anywhere within the classroom, and, in some cases, even outside the building.

A handful of schools have embraced the wireless idea full force, some even creating wireless communities that are accessible by whole towns. Others, like Lehigh, are testing the waters one toe at a time. The first class to take advantage of this new room is the Engineering I, or Engineering Computations. Students are offered laptops upon entering the classroom for use while learning C++ as well as other useful computer programs.

This new addition to Mohler Lab is just one small step of many that Lehigh plans to take in the future to keep our programs extremely competitive and up to date with technology.

IGERT and Integrated Business and Engineering

IMSE has expanded its curriculum by offering two new graduate and undergraduate programs: IGERT-GML and the Bachelor of Science Degree in Integrated Business and Engineering (IBE).

IGERT-GML is a NSF sponsored doctoral program whose focus is on Global Manufacturing Logistics (GML). The program has a multi-disciplinary research agenda that includes core manufacturing logistics research, electronic commerce, and global logistics. The vision of this program is to provide unique Ph.D. experience that prepares students to become national and international leaders in manufacturing logistics either in industrial or academic settings. IGERT fellows will receive either a Ph.D. in Industrial Engineering from Lehigh University or a Ph.D. in Operations and Information Management from the Wharton School at the University of Pennsylvania.

IGERT research projects may be joint efforts supervised between faculty at Lehigh University, University of Pennsylvania, and other affiliated institutions. Collaboration and interaction among students from both programs is strongly encouraged. This interaction will provide students with a shared and broader research perspective than would be attainable by either of the programs individually. The involvement of faculty participants from multiple disciplines and institutions will significantly broaden the scope of such collaboration resulting in a rich and dynamic environment for the identification and pursuit of new research directions.

Lehigh University's new state-of-the-art honors program leading to a Bachelor of Science Degree in Integrated Business and Engineering (IBE) is designed to prepare leaders of the corporate world for the 21st century by providing them with a sound foundation in both management and technology. This is made possible through a partnership between Lehigh's College of Business & Economics and P.C. Rossin College of Engineering & Applied Science.

Lehigh undergraduate students admitted into the highly selective four-year program, which began in September 2000, will address the constantly changing realities of the new industrial and professional marketplace. Students will be prepared to make decisions related to technology and product and process development in a way that combines technical, financial, marketing and strategic dimensions.

The joint program brings together the resources and faculty of both colleges. In addition to integrated courses in engineering and business, students are required to take courses in mathematics, science, English and the humanities. They also must demonstrate proficiency in a foreign language. This partnership has also brought forth a new graduate program — called the Master of Business Administration and Engineering (MBA&E) program.



Memorial Resolution
Guruswami Sathyanarayanan
Lehigh University – May 1, 2000

It is with deep sorrow that the Department of Industrial and Manufacturing Systems Engineering notes the passing of Prof. Guruswami Sathyanarayanan. Known affectionately as "Sathya" by his students and colleagues, he died of a heart attack on March 14 at the age of only 47 years. He was on sabbatical from Lehigh University and working as a Fulbright Faculty Fellow at the Indian Institute of Science in Bangalore, India at the time of his death.

Sathya received his Bachelor of Engineering degree in Mechanical Engineering from the University of Madras in 1975 and his Masters of Technology degree from the Indian Institute of Technology at Madras in 1977 in Production Engineering and Machine Tool Technology. After spending several years in industry, he completed his Ph.D. in Mechanical Engineering at Michigan Technological Institute in 1984. He came to Lehigh University in that same year as an Assistant Professor of Industrial Engineering. He was promoted to Associate Professor in 1989 and to full Professor in 1995.

It is no exaggeration to state that Sathya was internationally known for his research in machining technology and manufacturing process modeling. In addition to his research activities here at Lehigh, he had also served as a visiting scholar for one year in Germany and India in 1991-92, and then again in Germany in 1993 and 1999. He was twice awarded the Alexander von Humboldt Research Fellowship, one of Germany's most prestigious research honors. Shortly after Sathya's death, we received the following letter from Prof. Dr.-Ing Eckart Uhlmann of the Technical University of Berlin:

"Our staff wishes to express its sincerest regret for the death of Prof. Sathyanarayanan which came totally unexpected. Prof. Sathyanarayanan has twice spent a period of 6 months as a Visiting Professor at our Institute. His scientific contributions and especially his profound expertise were greatly appreciated by his colleagues. We got to know him as a hard-working, kind and helpful person. Prof. Sathyanarayanan inspired all those who had the privilege to know him."

His specialties within the field of machining technology included cutting tool materials; the grinding process, especially the grinding of ceramics and superalloys; non-traditional machining processes, in particular electrochemical grinding, ultrasonic machining, and abrasive flow machining; and the machinability of powder metallurgy parts. He was widely published in these technology areas.

His work at Lehigh included research in all of these specialty fields, which involved collaborations with faculty not only in the Industrial Engineering Department, but also with faculty in Materials Science and Engineering. He developed several new courses in these areas, including a course for industry on Advanced Cutting Tools that was taught during the summer. Sathya possessed a keen interest in making his research relevant to industry. He collaborated with a number of companies in the Lehigh Valley as well as elsewhere. Most notable was his work with a high-technology company in Pittsburgh called Extrude-Hone, a producer of non-traditional machining equipment, and several pieces of which we have in our Manufacturing Technology Laboratory, thanks to Sathya. His professional reputation and devotion to his research have contributed much prestige and distinction to Lehigh University.

As an educator, Sathya was knowledgeable and enthusiastic about his subjects, and he was caring and supportive for his students. We received a letter from one of his former graduate students shortly after Sathya's death, excerpts of which are as follows:

"Dr. Sathya was above all other things, a genuine, caring human being who took an interest in the lives and academic progress of graduate students. As the graduate advisor, Dr. Sathya constantly polled students on their research progress and encouraged those students who were having difficulties. At one point very early in my doctoral work, I was unsure of which area of industrial engineering to delve into for a dissertation topic. Dr. Sathya graciously volunteered to take me under his wing and encouraged me to learn more about manufacturing processes. He even invited me to attend my first academic research conference with the rest of the graduate students whose research he supervised. I will never forget this heartfelt attempt at providing guidance and direction for a confused graduate student."

As a person, Sathya was kind, courteous, and collegial. Rarely did he utter a word in anger. He was a gentleman. He was a loving husband and a caring father. We offer the sincere sympathies of the faculty and other friends at Lehigh to his wife Gita and his son Deepak.

Respectfully submitted,

Mikell P. Groover,
Professor of IMSE, P.E.

Louis A. Martin-Vega,
IMSE Professor and Chair, 1994-1998

Michael Bartolacci
Ph.D. IE 1995
Penn State University Faculty

At the faculty meeting of May 1, 2000, this memorial resolution for Prof. Sathyanarayanan was made a part of the permanent record by inclusion in the minutes of the meeting.

Faculty Updates

John W. Adams: Professor Emeritus since 1995 teaches one course each semester in the Master's of Quality Engineering Program. At present the courses are transmitted via satellite to the student's work sites.

Keith M. Gardiner: Prof. Gardiner continues his efforts with learning empowerment. His summer class on Total Quality Management comprised 30 students, 5 in the classroom at Mountaintop and the remainder distributed across the country between Georgia, Virginia and Pennsylvania. First they worked in virtual teams undertaking research on aspects of management, and then individual research reports were compiled into a 249-page publication. The 35 students in the fall class on Organizational Planning and Control assembled comprehensive studies of the multiple ramifications and history of the tobacco industry, and compared company organization and strategies with selected beer and liquor purveyors. Meanwhile Gardiner also served as the secretary-treasurer of the Society of Manufacturing Engineers for 2000.

Mikell P. Groover: Professor Groover was elected to a three-year term on the Board of Directors of the Material Handling Education Foundation (MHEF). The MHEF provides nearly \$80,000 annually in scholarships to college students who plan on pursuing careers related to material handling. Companies that provide products and services in this field donated to the scholarship funds. The second edition of Professor Groover's book *Automation, Production Systems, and Computer Integrated Manufacturing* will be published by Prentice Hall this coming June 2000. The first edition of his book is widely used at universities throughout the United States.

Joseph C. Hartman: Professor Hartman has continued his research in the area of replacement analysis and transportation logistics. This past summer, Dr. Hartman received the CAREER Award from the National Science Foundation for his proposal entitled "Large-Scale Parallel Replacement Analysis." This will provide funding to support graduate students for the next four years. He was also awarded the Eugene Grant Award from the American Society for Engineering Education for the best paper published in *The Engineering Economist*. The paper, entitled "A General Procedure for Incorporating Asset Utilization Decisions into Replacement Analysis," focuses on making asset replacement decisions while considering how an asset is used in its manufacturing or service environment.

Louis A. Martin-Vega: Dr. Martin-Vega is on leave at the National Science Foundation in Arlington, Virginia where he currently serves as the Acting Assistant Director of NSF for Engineering.

S. David Wu: As department chair since fall 1999, Dr. Wu was kept very busy dealing with all areas of the department. He led a university task force that started the Integrated Business and Engineering (IBE) program, an undergraduate honors program between engineering and business. He also organized the campus-wide workshop in Information Science and Technology. With the faculty, he has been developing new undergraduate and graduate degree programs in Information and Systems Engineering to be launched in the near future. He continued his research in the area of logistics and supply chain, and has received major funding from NSF to start a new IGERT doctoral fellowship program in Global Manufacturing Logistics (GML). The GML program started in fall 2000 in partnership with the Wharton School at UPenn.

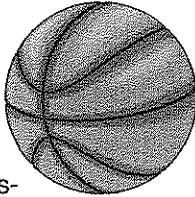
George R. Wilson: For the last several years, Prof. Wilson has been working on a project with IBM / Service Parts Solutions in Mechanicsburg, PA. He's been looking at large scale logistics issues aimed at getting parts to a customer within a contracted time window. A New England pilot study has indicated that his "Inventory Neighborhood" model implementation can lead to significant savings. Follow-up research is being proposed to the National Science Foundation for graduate student funding.

Emory Zimmers: Dr. Zimmers is one of seven professionals honored recently as a Fellow of the Society of Manufacturing Engineers. This recognition acknowledges his important contributions to the field of manufacturing in the areas of education and transfer and development of new technologies with industry. Dr. Zimmers is currently working on the development of a program entitled, "A Collaboratory for Enhanced Learning in the 21st Century". The Collaboratory will be a technologically enabled, collaborative learning facility. Dr. Zimmers has also contributed a chapter to The Mechanical Engineers Handbook, published papers on the optimization of manufacturing facilities, and, as director of the Enterprise Systems Center, is responsible for sixteen projects in partnership with private industry and government agencies.

IIE Activities

The Institute of Industrial Engineers (IIE) here at Lehigh has held many exciting and fun activities in the past. The fall semester 1999 opened with Jennifer Wise as President, Radik Tadiashvili as VP Publicity, Cheryl Zsido as VP Membership, Bryan Egen as VP Development, Alison Totman as Secretary, and Christina Henry as Treasurer. Dr. Hartman is the faculty advisor.

One activity that semester was the student/faculty basketball game in October. The faculty won the tournament.



Was this due to Professor Hartman's incredible height, pure luck, or the faculty's overall skill? Professor Robert Storer had this to say about the game.

"A group of 5 old, out of shape professors and graduate students took on a group of close to twenty undergrads. The faculty team consisted of Professors Storer, Hartman and Tonkay along with grad students Matt Galati and Rafael Paredes. We played six games in total, each game to 10 baskets. Wave after wave of fresh undergraduates took on the faculty team. Despite the overwhelming odds against the faculty, they won all six games. The undergraduates never scored more than 6 points in any game. How do I explain these surprising results? Superiority in all phases of the game. Superior guts, superior strategy, superior hustle, superior skill. By the end students were begging for mercy, and were heard to say that even statistics exams were less humbling than this basketball game."

Another activity was the holiday party at the Tally-Ho. This allowed students to have a great time conversing with the teachers and enjoying good munchies. It provided a nice relaxing time before finals and Christmas.

The spring 2000 semester started with an election for new IIE officers.

Anthony Hillman as President, Radik Tadiashvili and Sven Polz as VP's of Programming, Molly Price as VP of Membership, Erin Willey as VP Development, Alison Totman as Secretary, and Pedro Fajardo as Treasurer. Radik and Sven have worked on developing a great web page for IIE, which can be found at <http://www.Lehigh.EDU/~iniie/>.

The semester started out with a very informative interview workshop. Michelle Watson from career services came to Mohler and gave a short speech about what to do and not to do at a job interview. She also answered the audience's questions. Sven Polz believes that her "words were very inspiring."

A plant tour to Just Born occurred in February. There was a big turnout for this exciting trip. Students and faculty both learned about the inner workings of the candy factory. "They gave out lots of free candy and we even learned about some of the trade secrets" said Anthony Hillman. Another plant tour also took place at UPS in Philadelphia. Those students that attended learned about the facility layout and operation of the plant.

Two other, more social and relaxing events also occurred. A movie night for all IEs took place showing the movie *Goonies*. While the turnout was not what was expected Cory Crawford said "that it was a great choice in movies." The other was an end of the year barbecue held in the sculpture garden. It was very fun and gave students a chance to unwind before finals started.

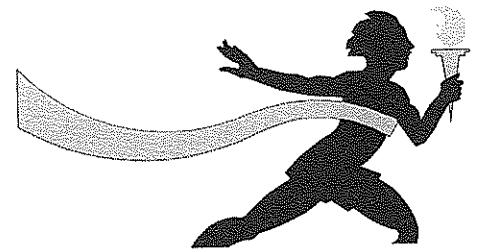
That year's Industrial Engineering activities were entertaining and many were very informative. These activities helped the Lehigh University IIE chapter earn a gold rating that was only obtained by one other university in the country.

The fall 2000 semester had some exciting events also. These included a faculty/student volleyball game. While this game was not as exciting as the previous year's basketball game it still was very entertaining. These games provide the IE students and faculty a

chance to interact outside the classroom. A resume workshop was also provided for students to improve their resumes.

The annual Holiday Party was again held at the Tally Ho Tavern. It was a gigantic success. The turnout of both students and faculty was more than expected. Everyone had a great time enjoying the holiday celebration before they had to begin cramming for finals.

At the end of this semester a new executive board was elected. The new board consists of President Andy Blumenstock, VP Development John Kovich, VP Membership Karen Kelly, Co-VP Programming Brent Miller and Bryan Ursic, Secretary Alexandra Feinstein, and Treasurer Lauren Ross.



On event this semester was an IE resume marathon where nearly 20 IEs showed up to receive critique and assistance on their resumes by career service counselors and peer educators. Planned are various plant tours, and guest speakers from IEs in the industry. We are planning on having a fun event with students and faculty, either a basketball game, volleyball game, or possibly a whitewater-rafting trip this semester also.

In addition, Alison Totman '01 will be representing Lehigh at the Regional Conference in Buffalo NY by entering the IE technical writing competition. Also, the groups of students in the IE 305 simulation class are entering the IIE National Simulation contest and finalists will appear at the National Conference in Dallas Texas to present their models and reports and field questions regarding their simulation. These events will surely be as successful as previous years.

IMSE Questionnaire

The IMSE department continually strives to improve the undergraduate program. As part of this effort, we would like feedback about your view of the IE undergraduate curriculum. On this page is the program's educational objectives. Following the objectives we ask you to provide feedback about how well you believe they have been achieved. Please remember to include your name, address and any additional new information about yourself.

Please detach, fold and mail to:

Harold S. Mohler Laboratory
Lehigh University
200 West Packer Avenue
Bethlehem, PA 18015-1592

Please circle your response:

1-Strongly disagree 2-Moderately disagree 3-Neutral 4-Moderately agree 5-Strongly agree

A graduate of the IE degree program should:

1) have a broad knowledge of mathematics, science and general engineering. Furthermore, this knowledge can be applied to Industrial Engineering related problems	1	2	3	4	5
2) have a fundamental grounding in the fields of statistics, manufacturing, operations research, information technology, production analysis and control, and operations management that reflect current needs and trends	1	2	3	4	5
3) have the detailed and relevant knowledge and ability to design and solve problems related to integrated systems that include people, materials, information, equipment, and energy	1	2	3	4	5
4) have the ability to design, conduct, and analyze experiments in laboratories, companies, and on systems models	1	2	3	4	5
5) have had the opportunity to form, lead, and act [have the ability to both lead and act – original form] as a participant on multi-disciplinary teams that solve problems in engineering and business	1	2	3	4	5
6) have an awareness of global, societal, and discipline specific issues necessary to identify, formulate and solve problems	1	2	3	4	5
7) know the NSPE professional code of ethics and have an appreciation of social and legal concerns	1	2	3	4	5
8) have the ability to seek out, understand and apply new information and procedures to their professional development, thus giving them an appreciation for life-long learning	1	2	3	4	5
9) communicate effectively through oral and written presentations using appropriate technologies	1	2	3	4	5

In your view, which of the above objectives have been strongly achieved (list the numbers from above)?

In your view, which of the above objectives have been minimally met?

In your view, which of the above objectives have not been met (please provide additional detail)?

Are there other objectives that we should include?

Name _____ Address _____
Work Title _____ New Info _____

INFORMS Annual Meeting

Themed by Integrating Theory & Application, the new INFORMS Annual Meeting was held at San Antonio, Texas from November 5-8, 2000.

All the Operations Research professors and doctoral students from Industrial and Manufacturing Systems Engineering (IMSE) department of Lehigh gathered at the conference as the best opportunity to expose the most current research and applications. Dr. David Wu chaired the panel entitled Research Directions in Manufacturing Logistics and also presented his recent research on transaction paradigms in the Electronic Market-Driven Supply Chain. Dr. George Wilson proposed a new inventory neighborhood approach for time sensitive service parts at IBM. Ph.D. students who participated in this project were Selcuk Avci and Matt Galati. Working on different applications of Mixed Integer Programs, Professors Bob Storer, Joseph Hartman and Ted Ralphs contributed their researches on Iterated Constructive Heuristics, Cutting Plane Solution Approach, and Branch & Cut Algorithm, respectively. Other Ph.D. students presenting at INFORMS 2000 were: Jaime Bustos, Nianpin Cheng, Murat Erkoc, Kadir Ertogral, Hakan Golbasi, Mingzhou Jin, Suleyman Karabuk, and Peiling Wu.

The INFORMS 2000 Doctoral Colloquium was also held for two days preceding the INFORMS San Antonio Meeting. About 25 professionals from academia and industry made presentations to and lead discussions with doctoral students from nationwide major universities. Ph.D. Candidate Suleyman Karabuk from Manufacturing Logistics Institute attended the colloquium and shared his wonderful experience with other doctoral students of IMSE.

IIE Conference in Pittsburgh

The IIE Northeast Regional Student Conference was held from April 7-9 2000 at the University of Pittsburgh. The theme of the conference was "21st Century Technology and the New IE". Four Lehigh IE executive board members attended along with Dr. Joseph Hartman the faculty advisor. These students included Anthony Hillman (President), Radik Tadiashvili (VP Programming), Erin Willey (VP Development) and Alison Totman (Secretary).



The conference included speakers such as Bart O. Nnaji, a professor at University of Pittsburgh. He spoke about IE's staking claim to their contribution in engineering. Brad Parrish from FedEx Ground gave a very informative speech about transportation engineering and technology. After lunch, Jeff Arnold, from H.B. Maynard and Co., Inc., spoke about lean manufacturing. He described what it was and explained how he believed it was the next industrial revolution.

After the speakers, free time was given so students could explore the campus and its surroundings. An interesting tour of the Industrial Engineering building was also given. During this time a technical paper competition was held. Anthony participated in this contest, presented a well thought out paper entitled "A Probabilistic Inventory Model of Infinite Horizon", and received second place. He believes that "it was a great experience". This is an honor for him as well as Lehigh.

The night ended with an awards banquet. It was a great chance to eat good food and get to know IE's from all over the Northeast. Dr. Randy Sadowski from Systems Modeling Corporation spoke about common sense for the IE in the 21st Century. He made many good points and provided tips for the students as well as the faculty present.

Moving IE Into the Information Age

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tems, software development, and web-based systems. Curriculum and research collaboration with Computer Science and Engineering is to be expected.

Curriculums at the B.S. and M.S. levels are currently been developed by IE faculty following the three areas of concentration. The degree programs will go through official approval process in academic year 2001-02.

