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# Letter from the Chair



We have been in high gear for the whole year! It started with preparations for the ABET review. Faculty, staff and students worked synergistically to engineer the review result of no deficiencies but strengths in our undergraduate program. Many star players to note here, but without one we would not have this result: Dr. Jo Min!

In the Operations Research and Analytics focus area, IMSE continued its march to becoming better known, better engaged through high visibility projects in the agriculture domain. There is no other IE or OR department in the nation that can claim domain expertise more legitimately than us. I am proud of my colleagues who ventured in this very complex direction. When I am asked if agriculture needs analytics, I have many success stories to tell.

Our Human Factors/Ergonomics group is one of the best in the nation with a repertoire of expertise covering the whole human in work/performance settings. They are active in areas of systems engineering, manufacturing; and they have been growing connections and expertise in the healthcare domain.

IMSE's manufacturing group has led large budget projects for the last 15 years; today is no exception. These large projects connect us internally and to external experts in the nation. Given that manufacturing is a growth sector for Iowa, and manufacturing activity has been 20% more than the surrounding states, this area is an investment priority for IMSE.

In this newsletter, you will see highlights from our experiences as faculty, staff and students of IMSE. Overall, this past academic year has been a great one; I am proud of my colleagues and our students.

May the Cyclone Power be with you, GO CYCLONES!

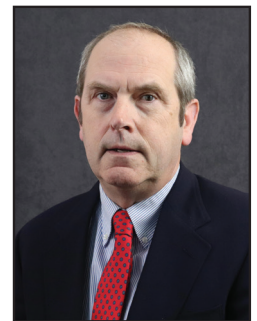
Gül E Kremer  
Professor and C.G. "Turk" and Joyce A. Therkildsen  
Department Chair

## On the cover

Students in IE 348 learn about metalcasting and its associated processes. The student to the right uses her phone to video the process. Phone cameras are becoming an increasingly popular tool used by students in the classroom.

## Jackman to NSF post

Experienced scholar and educator John Jackman has been appointed program director in the Division of Undergraduate of NSF's Education and Human Resources Directorate in Alexandria, Virginia. In this position, he will serve to sustain excellence in U.S. STEM education at all levels, in all settings for the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians and educators and a well-informed citizenry.



Jackman

National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 to promote the progress of science; advance the national health, prosperity, and welfare; and secure the national defense. With an annual budget of \$8.1 billion (FY19), NSF is the funding source for approximately 24 percent of all federally supported basic research conducted by America's colleges and universities.

"This is a great opportunity to obtain a much broader perspective on what is happening in the research community and also a chance to have a national impact on the nation's research agenda by promoting transformative research. My research experience at ISU has helped me develop a comprehensive understanding of the research process from the articulation of a research problem to managing research projects," Jackman said.

Jackman holds a BS in chemistry from Rensselaer Polytechnic Institute, and an ME and PhD in industrial engineering from Penn State University. He served as an assistant professor at Penn State before joining the Iowa State faculty in 1987. During his career at Iowa State he has advised 21 IE master's students and 12 PhD students. He has served as PI or co-PI of 37 grants or contracts totaling nearly \$16 million dollars in funding.

Jackman is a senior member of the Institute of Industrial Engineers and a member of the American Society for Engineering Education. He served as president of the Manufacturing and Design Division of the Institute of Industrial and Systems Engineers (IISE) from 2015 to 2017 and as past president from 2017 to 2019. He currently serves as technical vice president with a term ending in 2020. In 2018, he received the John L. Imhoff Global Excellence Award for Industrial Engineering Education from American Society of Engineering Education.

"We will feel Dr. Jackman's absence in our department. However, we all are very excited and proud about having one of us serve the nation at this capacity. John's background and experience will be an asset to NSF!" said Gül Kremer, Therkildsen Chair of IMSE. Jackman's appointment with NSF took effect on May 28, 2019.

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## NSF grant aims to train research-based graduate students for various career paths

A National Science Foundation (NSF) grant awarded to an interdisciplinary team led by an industrial engineering faculty member will combine elements of engineering with agriculture, economics and sociology to prepare research-based graduate students for an array of career paths.

Sarah Ryan, Joseph Walkup Professor in industrial and manufacturing systems engineering (IMSE), will serve as the Principal Investigator (PI) on a nearly \$3 million grant awarded by NSF's Division of Graduate Education. Ryan said this traineeship project will help to prepare research-based graduate students for a variety of career paths, including research scientists, bioeconomy entrepreneurs, agribusiness leaders, policy makers, agriculture analytics specialists and professors.

"The research theme is data-driven systems modeling and decision making to more efficiently produce food, transform primary energy sources into energy carriers, and enhance water quality. The interactions among these three efforts create opportunities to improve the design and operation of all three systems together," Ryan said.

Through this project, the research team will train 48 MS and PhD students, including 24 funded PhD trainees, from agricultural and biosystems engineering (ABE), agronomy, IMSE, mechanical engineering (ME), and natural resource ecology and management.

In addition to Ryan, the research team consists of four co-PIs, all of whom bring a different set of expertise: Robert C. Brown, distinguished professor in mechanical engineering and Gary and Donna Hoover Chair; Amy Kaleita, professor of ABE; Sergio Lence, professor of economics and Marlin Cole Chair of International Agricultural Economics; and Michelle Soupir, associate professor of ABE.

"The research is inherently interdisciplinary and requires understanding of how food, energy and water systems interact. Some of the PIs and core participants bring expertise in one or more of those domains," said Ryan. "We also have team members that focus on the economic and sociological aspects of implementing solutions in the context of Midwest agriculture as well as team members with expertise in systems modeling and data analytics."

Ryan's IMSE expertise on the project will focus on a systems perspective with emphasis on modeling, analysis, simulation and optimization for making better decisions.



Ryan

"The IMSE capabilities for specifying objectives, identifying constraints, and recognizing opportunities for innovation help us to manage tradeoffs in complex systems," Ryan said.

The traineeship program will cover four components. First, trainees will develop a fundamental understanding of interactions among food production, water quality and bioenergy; data acquisition, visualization, and analytics; complex systems modeling for decision support; and the economics, policy and sociology of the food, energy and water (FEW) nexus.

Second, participants will conduct interdisciplinary research on technologies and practices to increase agriculture's contributions to energy supply while reducing its negative impacts on water quality and human health, data science to increase crop productivity within the constraints of sustainable intensification, and decision sciences to manage tradeoffs and promote best practices among diverse stakeholders.

Next, they will participate in a new graduate learning community consisting of a two-year series of workshops that focus in alternate years on the context of the Midwest agricultural FEW nexus and professional development, with emphasis on communication, entrepreneurship and collaboration.

Finally, they will have small-group experiences to promote collaboration and peer review. Each trainee will create and curate a portfolio that combines artifacts from coursework and research with reflections on the broader impacts of their work.

Gül Kremer, IMSE professor and C. G. "Turk" and Joyce A. Therkildsen Department Chair in IMSE, said that this traineeship program will be immensely beneficial to all graduate students involved.

"With experience as director of graduate education and a national reputation for her scholarship no further testament is needed for Dr. Ryan's preparation to lead this project," said Kremer. "The FEW area Dr. Ryan and the whole PI and trainee team will tackle is very complex, involving technical matters across disciplines but also appropriateness to context considerations. I cannot think of a better team, a better leader for this task inspiring all of us to be better with our contributions to this critical area for our state."

Work on this project began in September 2018 and the traineeship funding continues through August 2023.

## Thanks for your service, Jeff and Kevin!

After careers at Iowa State that have spanned a combined three-quarters of a century, IMSE Program Coordinator Jeff Eichorn and Senior ERD Machinist Kevin Brownfield are calling it quits.

Big thanks to both of them for all they've done for us. We hope your retirements are full of fishing, hanging out with the grandkids, vintage cars, working in the shop (for fun this time!) and everything else you love to do!

*Kevin Brownfield (third from left) and Jeff Eichorn (fourth from left) pose with students during a retirement reception hosted for Jeff in the Black Engineering Building on May 3, 2019.*





# Student honors

## Undergraduate awards

**Moir Henderson** - Received the **Dean's Student Leadership Award** for 2019.

**Christopher Hernandez** - Named **Outstanding Senior** by Iowa State's College of Engineering for Spring 2019.

**Taylor Kjeldgaard** - Named **Outstanding Senior** by Iowa State's College of Engineering for Fall 2018.

**Hans Mueller** - Awarded **3rd place** at the 2018 Syngenta Crop Challenge in Analytics.

**Megan Wellner** - Awarded **2nd place** in the Undergraduate Research Competition for 2018 by the Institute of Industrial and Systems Engineers.

## Graduate awards

**Enrique Alameda Basora** - Received the **Research Excellence Award** for Spring 2019 by Iowa State University.

**Zachary Amenda** - Received the **Teaching Excellence Award** for Fall 2018 by Iowa State University.

**Reyhaneh Bijari** - Received the **Teaching Excellence Award** for Fall 2018 by Iowa State University.

**Saeed Khaki** - Awarded **2nd place** at the 2019 Syngenta Crop Challenge in Analytics.

**Kevin Korniejczuk** - Received the **Teaching Excellence Award** for Spring 2019 by Iowa State University.

**Anuj Mittal** - Awarded the **Summer Institute of Sustainability and Energy (SISE) Fellowship** for 2018.

**Thomas Schnieders** - Received the **Teaching Excellence Award** for Spring 2019 by Iowa State University.

**Jacklin Stonewall** - Awarded **2nd place** in the student paper category for "Energy Use and Weatherization Practices: Applications for Agent-Based Modeling to Support Vulnerable Populations" for the Human Performance Modeling Technical Group section of the Human Factors & Ergonomics Conference in 2018.

**Guliz Tokadli** - Named the **Best of Session paper** for "Human-Agent Team for Space Operations Beyond Low-Earth Orbit" at the Digital Avionics Systems Conference in 2018. Also received the **Research Excellence Award** for Spring 2019 by Iowa State University.

# Faculty and staff honors

## Faculty

**Michael Dorneich**  
Associate Professor

Received the IMSE Omurtag Award for Research Excellence from the Department of Industrial and Manufacturing Systems Engineering

**Stephen Gilbert**  
Associate Professor

Received the Dean's Diversity and Inclusion Excellence Award from the ISU College of Engineering

**Steve Vardeman**  
University Professor

Received the Exemplary Faculty Mentor Award from Iowa State's Office of the Senior Vice President and Provost

Also received the IMSE Chair's Choice Award from the Department of Industrial and Manufacturing Systems Engineering

**Lizhi Wang**  
Associate Professor

Awarded 3rd place in the 2018 Syngenta Crop Challenge in Analytics

## Staff

**Jeff Eichorn**  
Program Coordinator

Received the 35-year service award from Iowa State University

**Mike Renze**  
Systems Support Specialist

Received the Dean's Staff Excellence Award from ISU's College of Engineering

**Holly Twedt**  
Administrative Specialist

Received the IMSE Omurtag Award for Staff Excellence from the Department of Industrial and Manufacturing Systems Engineering

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# Longtime IE Professor Thomas Barta (1935-2019)

Longtime industrial engineering professor Thomas Barta passed away on May 16, 2019.

Barta was born in Cedar Rapids, Iowa and graduated from Iowa State with a BS (1957), MS (1962), and PhD (1975), all in industrial engineering. He served as a Lieutenant (junior grade) in the United States Navy from 1957 to 1960 and joined the Iowa State's IE faculty as an assistant professor in 1969. He was promoted to associate professor in 1975 and to full professor in 1986. Barta retired in 2003 with the rank of professor emeritus.

During his time at Iowa State Barta taught IE 305, IE 465, IE 419, IE 519, and IE 520, among others. He also published countless research articles and in 1989 he developed a computer program, funded by the Iowa Civil Rights Commission, to help local and state authorities when dealing with cases of housing discrimination.



Barta



# IMSE graduates 210 students during 2018-19 school year



*Undergraduate industrial engineering students pose during the pre-commencement ceremony at Troxel Hall on May 11, 2019.*

The Department of Industrial and Manufacturing Systems Engineering (IMSE) graduated 210 students during the 2018-19 school year.

The fall 2018 graduating class included 56 bachelor of science (BS) in industrial engineering (IE) degrees, one from the masters of engineering (MEng) in Systems Engineering, five from the MEng in Engineering Management, one with MEng in IE, and five with masters of science (MS) in IE.

The spring 2019 graduating class included 109 BS degrees in IE, five from the MEng in Systems Engineering, six from the MEng in Engineering Management, five with MEng in IE, seven with MSIE, and two with PhDs in IE.

The department hosted its undergraduate pre-commencement ceremonies at Troxel Hall on the morning of the university-wide commencement ceremony in the fall and the spring. Each event featured refreshments as well as an address from Gül Kremer, C.G. "Turk" & Joyce A. Therkildsen Department Chair and professor of IMSE. After Kremer's address, each student was

recognized and had the chance to take the podium to share their future plans as well as some of their favorite memories from their adventure at Iowa State.

The graduate student commencement ceremony takes place on the Thursday of finals week. This ceremony includes students from all departments within the graduate college.

"I am so proud of all of our graduates who have worked so hard and represented our department and our university well during their time here," said Kremer. "It's always bittersweet to see them go because while we're glad they're able to get jobs, go to graduate school, and move on to the next chapter in their life, it's kind of sad knowing that their time with us has come to an end. With that said, I hope they know that they're always welcome to come back and visit us whenever they can."

These graduates join an alumni base that is now more than 5,300 strong.

*Undergraduate industrial engineering students pose during the pre-commencement ceremony at Troxel Hall on December 15, 2018.*



# Thank you!

*Individual donors to IMSE from May 15, 2018 thru May 8, 2019*

Jerry Allen and Beverly Allen  
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# Peters appointed Study Abroad Center director

Frank Peters, associate professor and C.G. "Turk" and Joyce A. Therikildsen Professor of Industrial and Manufacturing Systems Engineering, has been named director of the Study Abroad Center. Peters began his three-year, 75 percent appointment Jan. 2.

"Study abroad is a high-impact learning opportunity that helps students develop cultural competence and become more well-rounded global citizens," said Ann Marie VanDerZanden, associate provost for academic programs. "Frank will work with the colleges to develop and expand programs around the world, and help make study abroad accessible to every Iowa State student."

More than 1,800 students studied abroad in 55 countries during 2017-18. The Study Abroad Center assists students and faculty with program selection and preparation, as well as applying for passports and visas. This ensures



Peters

the students' graduation is not delayed because of their education abroad experience.

Peters, who joined Iowa State in 1996, holds bachelor's, master's and doctoral degrees in industrial engineering from The Pennsylvania State University, State College. He has been involved in study abroad activities over the last two decades, including programs in England, Scotland and Ireland.

"I look forward to working with faculty, the Study Abroad Center staff, and study abroad staff in the colleges to more fully connect our programs to students' overall academic experiences," Peters said. "We want to enable students to integrate the experience of studying, traveling and living internationally with coursework that prepares them for successful careers and lives in a global environment."

## Three IE student-athletes set school records in their respective sports

Three industrial engineering (IE) student-athletes set school records in their respective sports during the spring 2019 semester.

Evan Hundley, a senior swimmer in IE, broke school records in the 200 medley relay and the 400 free relay during the 2019 Big 12 Championships in Austin, Texas. Hundley and her relay team broke the school's nearly 10 year old record in the 200 medley relay with a time of 1:39.83. In the 400 free relay, Hundley and her relay team bested the previous school record with a time of 3:21.21.

Roshon Roomes, a junior in IE, set both a school record and collegiate record at the Big 12 Men's Indoor Track & Field Championships in Lubbock, Texas in February. Roomes took first place in the 600-yard run with a time of 1:07.67. His time beat the previous school record of 1:07.73, set by Frankie Atwater in 1991. His time also bested the previous NCAA record of 1:08.16 set by Texas Tech's Vincent Crisp in 2018. (The reason the previous school record was faster than the previous NCAA record was because the previous

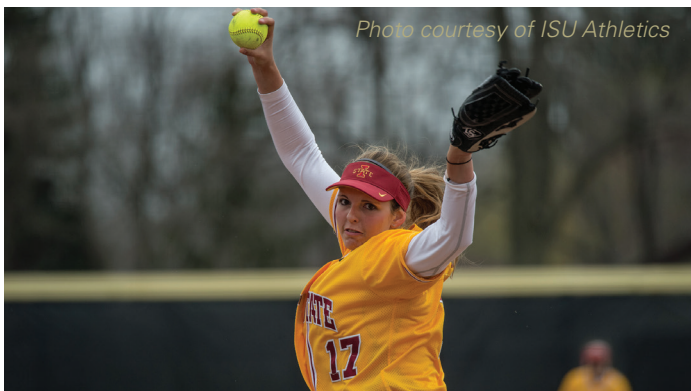
school record was set on an oversized [300 meter] as opposed to standard track [200 meter].) Roomes, who came to Iowa State via Woodbury, Minnesota, helped the Cyclones to a second-place team finish at the meet, marking Iowa State's best finish at an indoor conference track meet since 1997 when the Cyclones also took runner-up. Roomes' finish also marks the seventh conference title Iowa State has won in the 600-yard run in school history.

Emma Hylen, a senior pitcher, became Iowa State softball's all-time career save leader after helping the team to nab a 7-5 win over Harvard University in March. This marked Hylen's eighth career save and her second of the season. The Cyclones held a 6-2 lead heading into the bottom of the sixth inning, but a three-run rally by the Harvard Crimson brought the game within one heading into the final inning. Hylen, a native of Roseville, Minnesota, pitched the 7th inning and held her opponents hitless and scoreless, allowing her team to escape with the win.

*Photo courtesy of ISU Athletics*



*Photo courtesy of Liz Parke/  
Big 12 Conference*



*Photo courtesy of ISU Athletics*



# Update from the IMSE Industrial Advisory Council



*Members of the IMSE Industry Advisory Council, and a couple of extra friends. From left: Dan Varnum (IAC Member, MercyOne); Radek Kornicki (IAC Member, Danfoss Power Solutions); Kara Hobart (IAC Member, General Mills); Eric Flakne (IAC Member, Procter & Gamble); Wayne Flory (IAC Member, Collins Aerospace); Susie Lenssen (IAC Member, Boeing); David Rush (IAC Member, Tory Burch); Alan Caslavka (IAC Member, General Electric Aviation); Dave Gardner (IAC Member, HNI Corporation); Val Boelman (IAC Guest); Susan Hallbeck (IMSE Affiliate Faculty Member); Joe Byrum (IAC Member, Principal Financial Group); Shelley Finnestad (IAC Member, Edward Jones); Nat Harris (IAC Member, John Deere Waterloo Works); and Mary Beth Brown (IAC Member, Hallmark Cards, Inc.)*

*Not pictured: Dave Corbin, Vermeer Corporation; Greg Doonan, Syngenta; and Eric Ervin, J.B. Hunt Transport*

The IMSE Industry Advisory Council convened in Ames for their annual meeting on April 25-26, 2019.

The council, which now includes 16 members, is tasked with providing department administrators with industry insights which help to shape the curriculum and guide the department to provide students with the skills and knowledge necessary to succeed in today's field of industrial and manufacturing systems engineering.

"The IAC is invaluable to our department because they provide us with a firsthand account of what industry is looking for out of students if they want to be hired and succeed in today's field of industrial and manufacturing systems engineering," said Gül E. Kremer, professor and C.G. "Turk" & Joyce A. Therkildsen Department Chair of Industrial and Manufacturing Systems Engineering. "The feedback our IAC provides us impacts everything from our curriculum to our facilities to internships or co-ops and job placement after graduation."

This year's IAC meeting agenda featured the following important topics: 1) how does the current IE curriculum prepare our students for careers in manufacturing, healthcare and finance sectors? 2) appropriateness of analytics, systems engineering, and product engineering and creative problem solving as cross-cutting curricular foci, and 3) providing curricular programs to enhance our students' ability to learn.

The IAC includes representatives from various fields within industrial and manufacturing systems engineering including healthcare, insurance, manufacturing, aerospace, and more. During their recent campus visit, IAC members had the opportunity to tour the department's newest facilities, listen to presentations from students and faculty, attend the department's research symposium and awards banquet, and more.

Six new members joined the IAC for 2018-19 including: Alan Caslavka, GE Aviation; Shelley Finnestad, Edward Jones; Dave Gardner, HNI Corporation; Radek Kornicki, Danfoss; Susie Lenssen, The Boeing Co.; and Dave Varnum, MercyOne. Of the 16 IAC members, 11 are graduates of Iowa State.

"We value the input from all of our IAC members, and we know that for our ISU alums who serve that our university has an extra special place in their hearts," said Kremer. "We like that the IAC meetings serve as an opportunity for our members to help shape the department, but it's also a homecoming opportunity for those alums and it's fun to see them reminisce about how the campus and other things have changed since their time here."

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# Book celebrates 100 years of industrial engineering at Iowa State



**1946-47:** The Industrial Engineering option within General Engineering is first offered to juniors and seniors interested in "specializing in courses directed toward industrial operations."

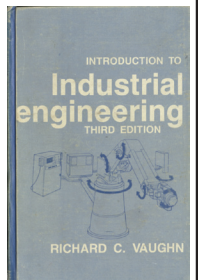
This sub-track included coursework in electrical, general, and mechanical engineering as well as economics, English, government, and applied and theoretical mathematics.

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**Spring 1967:** Don Eichner, a senior IE student, debuts a hovercraft that he designed and assembled as part of the IE senior design course during the 1967 VEISHEA celebration. He tested his product – dubbed "The Flying Mattress" – on Lake LeVenne as dozens of spectators cheered him on. Eichner's budget for the project was just \$15 and he got many of the materials for his invention from the Ames city dump, which at the time allowed the public to salvage useful materials. Reporters from *The Des Moines Register* and the *Iowa State Daily* were on scene to cover this unique event. Eichner went on to become an assistant professor of IE at Iowa State in 1981. He retired as a senior staff engineer for Iowa State's Center for Industrial Research and Service in 2001.

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**1970:** Arrangements are made to print a Spanish language version of Industrial Engineering Professor Richard Vaughn's popular textbook *An Introduction to Industrial Engineering*. Negotiations are also underway for an Indian language version of the textbook.

Vaughn served in the Navy and Coast Guard during World War II. He completed a B.A. from Michigan State College in 1948 and a Masters of Industrial Engineering from the University of Toledo in 1955. He served on the faculty at the University of Florida before joining Iowa State's IE faculty in 1962. During his 25-year career in Ames he published three textbooks. Vaughn passed away in 2016, at the age of 91.

Industrial engineering has existed on the Iowa State campus for more than a century. The original curriculum was a five-course sub-track within the mechanical engineering major and today the department offers one undergraduate degree, one undergraduate minor, and five graduate degrees. *Through the Seasons: 100 Years of Industrial Engineering at Iowa State University* is a colorful, picture-filled book that tells the story of the industrial engineering department on campus. It includes bits about the department's evolution, noteworthy research contributions, accolades from industrial engineering student-athletes, and much more.

## For a preview of the book and to place your order, please visit

[www.imse.iastate.edu/history-book](http://www.imse.iastate.edu/history-book)



### Award named after former ISU prof



IE Assistant Professor Eric Malstrom, right, works with a student in his robotics lab.

**Dec. 1983:** The Associated General Contractors of America establish the Thomas C. Jellinger Award for "the improvement of university construction and civil engineering programs." The award was named for Thomas C. Jellinger, a 1963 graduate of IE's master's program. Jellinger joined the engineering faculty at Iowa State in 1960, and in 1963 was named the Engineering College Professor of the Year. As a faculty member at Iowa State, he helped to establish the construction engineering curriculum which grew from four students during its first year in 1963 to more than 400 students in 1978, when Jellinger stepped down as head of the program.

**Jan. 1984:** General Electric donates an 800-pound, \$55,000 robot to the IE department. The robot – GEPSO – has a "lifting capacity of 22 pounds and can place that payload with an accuracy of 0.2 millimeters, making it one of the most precise production-size robots available." IE associate professor Eric Malstrom told *The Ames Daily Tribune*. "There are bigger robots in Iowa but none more sophisticated," Malstrom added. GEPSO joins five other programmable robotic arms which make up the department's robotics laboratory.

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Finnestad, center, poses with other members of the 1993 Big Eight champion women's golf team.



Caption from *The Des Moines Register*: "Iowa State Athletic Director Max Urick wipes away a tear Tuesday night as Iowa State golfers Shelley Finnestad, left, and Missy Arthur share a laugh after the Cyclones presented the Big Eight women's championship trophy to him at his Ames home."

**April 27, 1993:** Shelley Finnestad, a senior in industrial engineering, grabs medalist honors – three strokes ahead of the runner-up – as she helps to lead the Cyclones to their first Big Eight title for women's golf in school history. The Boone, Iowa native shot a 54-hole total of 232 at Firethorn Golf Club in Lincoln, Nebraska to top the field. The

three-time Academic All-American was the first Cyclone to win an individual women's golf conference title and in 1998 became the first ISU graduate to compete in the United States Women's Open at Blackwolf Run in Kohler, Wisconsin. She was inducted into Iowa State's Hall of Fame in 2005.

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# Teams from new industrial engineering course take top prizes at Engineering Pitch Competition

Teams from the Entrepreneurial Product Development Engineering (I E 434X) course took the top two spots at the Spring 2019 Engineering Pitch Competition.

Brad Lechton (senior), Brian Fleming (senior) and Konner Koerselman (junior) all of whom are majoring in industrial engineering (IE), took first place at the competition, while mechanical engineering (ME) seniors Taylor Goodness and Nick Muehlbauer were runners-up.

Lechton, Fleming and Koerselman won \$500 for the brand they developed, Serona Craft Butter.

"Our team focused on high-end flavored butter such as rosemary and bacon-chive," said Lechton, a native of Mundelein, Illinois. "We came up with our idea during an Engineering Product Development Entrepreneurship Club meeting. The club was discussing how Yoplait was able to change the packaging for Oui yogurt and turn the product into a success. We started looking for other products that have used packaging to grow sales and found that no one was innovating in the butter aisle. Which led to this project this semester. Just as craft beer has turned the beer market upside down by giving beer drinkers products with much improved taste, we want to do the same in the butter market."

The team was able to apply skills and concepts they learned in I E 434X, taught by Industrial and Manufacturing Systems Engineering (IMSE) affiliate faculty member Jim Fay and IMSE senior lecturer Dave Sly.

"The point of I E 430 and 434 is to give engineers the well-rounded set of skills, mindset and experiences they need to develop new products, whether as employees of companies, or entrepreneurially starting their own companies," Fay said.

The students found that the content they learned in Fay and Sly's classes was helpful when developing their pitches.

"Jim and Dave's class is the key to the success we have had thus far," said Koerselman, a native of Le Mars, Iowa. "Since day one, they have been emphasizing how important market research is to the success of a product. You want to understand what people will actually buy before investing countless hours and money into an idea or concept."



*Iowa State University President Wendy Wintersteen poses with the I E team that took first place at the university-wide pitch competition in March 2019. From left: President Wintersteen, Brian Fleming, Brad Lechton, Konner Koerselman and I E 434X course instructor Jim Fay.*

The team also applied other skills and concepts they learned in the IE curriculum more broadly.

"The industrial engineer in each of us tells us to quantify, quantify, and quantify," said Fleming, a native of San Diego, California. "This has been drilled into us and it helped us justify our pricing, manufacturing methods, and even advertising. If we did not get numbers to back up our choices, then we would be shooting in the dark."

The team said this project gave them a greater understanding of the food industry as a whole and the butter-making process specifically.

The second-place team, Goodness and Muehlbauer, won \$250 for their product which aims to improve the at-home beer drinking experience.

"We are developing a system to give beer Growlers a longer shelf life as well as a way to instantly customize the temperature at which the beer is served," said Muehlbauer, a native of Woodbury, Minnesota. "The user will be able to have a variety of beers and easily switch between them. We are working to create a higher level of customizability while improving ease of use."

Much like their classmates, the ME duo took market research and competitive analysis techniques from Fay and Sly's class to develop the idea. They also applied concepts that they learned in other areas of the engineering curriculum to the project.

"We have applied knowledge from thermodynamics and heat transfer classes to help identify possibilities for refrigeration methods that we can apply to our system," said Goodness, a native of Lakeville, Minnesota. "We have also applied design experience from Senior Capstone (M E 415) and Sophomore Design (M E 270) to develop the physical prototype. Finally, we used skills from Mechanical Component Design (M E 325) to aide in the manufacturing of this prototype."

Both teams were critiqued by a panel of judges including Fay, a graduate of chemical engineering at Iowa State; Sly, who holds a BS, MS, and PhD in IE as well as an MBA, all from Iowa State; Guy Barbier, an Iowa State business and finance graduate; and Patrick O'Donnell, an Iowa State ME graduate. There were 17 entries in this year's competition.



# IE student has a passion for photography

When he's not busy in the classroom, one industrial engineering student is busy behind the lens covering everything from presidential candidates to Cyclone athletics.

Max Goldberg, a junior in industrial engineering (IE), has balanced his time between his studies and his work as a photographer for both the *Iowa State Daily* student newspaper and Iowa State's admissions office. Goldberg said that at first he struggled with balancing his time between the rigorous IE curriculum with his photography activities.

"Time management has been a very big struggle of mine. I wouldn't say it's balancing between a job and studies, but more of balancing what I enjoy versus what I don't super enjoy," he said. "In terms of advice, I would say this: don't let curriculum stop you from what you love doing. No one is forcing you to graduate in eight semesters. Take your time. Do what you love."



**Goldberg**

During his time as a photojournalist for the *Daily*, Goldberg has had the opportunity to cover political events including rallies for Donald Trump, Hilary Clinton, and Bernie Sanders as well as both football and men's basketball games for the Cyclones. Goldberg's interest in journalism extends beyond just photography, and he also serves on the *Daily's* editorial board. He traces his interest in journalism back to high school, where he served as both a photographer and reporter for Grayslake Central's newspaper. By his senior year he was the paper's co-editor-in-chief.

"I've always been interested in journalism. I like to tell people that I'm an engineering major with an English brain," said Goldberg. "I wouldn't say I have that big of an interest in politics, but I do have an interest in policy. I wouldn't even say the policies themselves, but why the policies exist. Why did the administration want to create this policy? What data did they use? What does this policy aim to do?"

When it came time for college, Goldberg decided to pursue studies in engineering, knowing that he could continue to hone his photography and journalism skills through various opportunities on campus. He came in as a freshman wanting to study aerospace engineering, because of his love for space and NASA.

"However, I've come to realize that engineering has two forms of problem solving. First is creating something to solve a problem, which is more applicable in aerospace engineering, and second is improving something to solve a problem, which is more



*Photo courtesy of Max Goldberg*

applicable to IE. I felt that my skills and passion better lent itself to the latter," Goldberg said.

A shot Goldberg took of Iowa State's campus was recently selected to be used on campus parking permits beginning next fall. In addition to shooting photos for the *Daily* and for admissions, Goldberg has also been involved with M:2:1, specifically CyNest, a group which focused on creating an

autonomous drone landing and charging station. Goldberg served as the team lead for the station team and was in charge of not only creating the physical station, but coordinating with the needs of the drone team and software teams. Now, Goldberg is a member of the payload team for one of Iowa State's rocket teams, Rocket Shop.

Additionally, Goldberg did a co-op with Unison Comfort Technologies in Minneapolis during the spring and summer of 2018.

"At my co-op, I was tasked with creating a training program for more than 200 factory employees," said Goldberg. "During my time there, I learned effective task management techniques, and also how to write to an audience."

Goldberg plans to complete his BS in IE in fall 2019. After graduation he said he hopes to work in the aerospace industry, ideally working on process and system improvement. Much like photography was a break from the class work for him, he said that he encourages students to become involved with something they're passionate about outside of the classroom.

"Sometimes, all you need is a break. After a long day in class, I'd spend an hour or so walking around campus taking pictures of the sunset. Little breaks like that can help you keep your head straight."

*Photo courtesy of Max Goldberg*



# IMSE researcher aims to use optimized management and planning to improve plant breeding

An industrial and manufacturing systems engineering (IMSE) researcher who was recently named a Plant Science Institute (PSI) Faculty Scholar is working on a series of projects that help farmers in Iowa and beyond.

Guiping Hu, an associate professor of IMSE, was recently named to PSI's second cohort of faculty scholars. Hu is one of two researchers from the College of Engineering named to the newest cohort, which also includes researchers from agronomy; genetics, development and cell biology; plant pathology and microbiology; and statistics.

"I'm trying to design a decision-support system to advance plant breeding through optimized management and planning," she said.

Hu is currently working on three separate research projects which fall within the focus of the PSI. The first project looks at resource allocation strategies in genomic selection.

"What we are trying to do is use the gene-sequencing information in the previous generation, do some data analytics, which can tell them that by crossing one plant with another plant in a given timeline you're going to achieve the goal in the most time-efficient as well as cost-effective way possible," she said.

Her second project examines the field experiment design. This research aims to integrate statistical modeling, cluster analysis, and mathematical programming tools to optimize the sample experiment and field test design. The goal is to optimize the representativeness of the genotype, field profile, weather condition, and agriculture management options. With good field experiment results, the predictive model will be more accurate.

Hu's third project looks at precision farm management under variable soil and uncertain weather conditions. Hu and her research team have conducted case studies in Iowa, Nebraska and California. The team plans to use these data to develop a predictive model which will help farmers determine the best type of seed to plant on a given piece of land. Additionally the model will help farmers decide when to plant, when to apply fertilizer and pesticides, and how to develop an effective irrigation schedule.

"We have designed an integer program which shows that if we use the model it improves the profitability by about 100 percent compared to not using the model," said Hu. "The intent here is to improve plant breeding when the budget and resources are limited."



Hu said she thinks the uniqueness of her industrial engineering skillset is part of the reason she was named a PSI Faculty Scholar. Many of the topics she teaches in I E 312: Optimization will be relevant to her PSI research, particularly in regard to optimization and operations research. In fall 2018, Hu taught a new class – I E 487X: Big Data Analytics and Optimization – which she said was even more relevant to her PSI research because of its focus on data analytic tools that can be utilized in applications in predictive phenomics and related management practices.

"These are huge data sets so the first step is how do you analyze the data then use the data to make effective, efficient and timely decisions," Hu said.

Hu said she hopes to advance Iowa State's mission as a land-grant university through her research. She is developing two tools that she thinks will be beneficial to Iowa farmers. The first is a data analytics tool that can be used to develop a superior seed and the second is a management tool that farmers can use.

"I am collaborating with a couple of professors from agronomy and economics to design an on-line tool that allows farmers to input data about the type of seed, the location where it was planted, and other information and it will give output on best management practices, projected yield, and other information," she said.



# IE student pursues degree to honor her late father

An industrial engineering (IE) student wants to honor her late father by following in his footsteps and graduating from Iowa State.

Lydia Dawson, a senior in IE, grew up in Urbandale, Iowa, and remembers watching Cyclone football games with her father, Tim Dawson. This was her earliest exposure to Iowa State University and because of it she knew that one day she wanted to be a Cyclone. Lydia developed an interest in STEM (science, technology, engineering and math) in elementary school and was encouraged by her father, a 1981 graduate of Iowa State's industrial education program and a safety consultant by trade, to pursue her passion.

"My father was the most incredible person I have known to this day. He was my mentor, best friend, father and role model. I knew I wanted to be in engineering but it took me a while to really decide which field of engineering I wanted to be in," Lydia said.

When Tim was diagnosed with cancer in 2016, Lydia, then just 18 years old, knew that she wanted to study something that would help her father and millions of others battling the disease.

*In his free time, Tim Dawson played guitar in various Central Iowa area bands including Slipstream, The Rivas, and The Likely Suspects. Photo courtesy of Lydia Dawson*



"I discovered industrial engineering and what I could do within the field. I thought that being able to go into industrial engineering with a focus on human factors as well as biomedical and biomechanical applications would be one way to help," she said.

"I really want to be able to design and program medical machines to be able to detect cancer better and faster so people don't have to go through what I had to go through at such a young age. I know there are other majors that I can do in order to accomplish this, but since my dad went into this field, I wanted to go into it as well with a different approach to honor him and help people in the future."

Lydia arrived on campus in fall 2017 and enrolled as an IE student after transferring from Des Moines



*Lydia Dawson (right) poses with her father Tim. Photo courtesy of Lydia Dawson*

Area Community College (DMACC). It was on October 13, midway through her first semester at Iowa State, that her father lost his battle with cancer. Lydia transferred back to DMACC that following spring in an effort to help her family financially. She returned to Ames in fall 2018, but said that the pain of losing her father remains with her.

"Honestly, I am still trying to get through the hardship of losing my father. It has only been a year and there have been so many ups and downs throughout this year," said Lydia. "The one thing I have found to be helpful is knowing that my dad is no longer in pain

and also knowing that he would not want me to be sobbing everyday and to instead live my life."

She said that finding time for herself, often through taking walks, has been one method she has found to be effective when coping with his death. She also stays busy with her coursework and other activities on campus, and hopes to eventually join Iowa State's Biomedical Engineering Society. Lydia plans to complete her BS in IE in the spring of 2021 and after graduation wants to pursue a career in the biomedical field, designing medical equipment. She said she encourages other students with an interest in the medical profession to pursue a degree in IE.

"I felt that a degree in IE offered me more flexibility with my career aspirations than a degree in another engineering field would offer. I appreciate that IE focuses on both the technical side as well as the more humanistic side of engineering, particularly when it comes to the biomedical field."

*Lydia Dawson (right) poses with her mother, Kay, and her father, Tim. Photo courtesy of Lydia Dawson*



# Student gains valuable experience with co-op

Beginning in January 2018, industrial engineering senior Chris Johnson was hired as a sales intern for a co-op with Daktronics. Daktronics is a popular manufacturer of video displays and scoreboards, including displays and scoreboards at Iowa State's athletic venues. Johnson spent the spring and summer semesters working at their headquarters in Brookings, South Dakota, where he specialized in the high school and parks and recreation market management department.



Frequent travel to various conventions allowed Johnson the ability to learn more about the customers and the market. "Those days were long, but they were a lot of fun, as I got to see so many different high schools and different scenarios," Johnson said.

Finding a job in college that deals with your own personal interests and hobbies is a goal for many students. Johnson

was able to achieve that goal with his co-op.

"Without a doubt, getting the opportunities to be out in front of the customer and present our equipment and control system at demos was unforgettable," said Johnson. "Those experiences allowed me to learn how to sell really technical products and be able to relate those products to a customer who may not be very tech-savvy."

"As someone who has always been interested in sports, sales and engineering, this was a unique blend of all three of those, and that led to me being passionate about combining all of those topics together," Johnson said.

Johnson held a role that focused more on technical sales and sales engineering, while also helping product managers respond to current market trends.

Johnson has been able to work remotely for Daktronics while continuing his studies here at Iowa State.

# IE senior and first-year MBA student combines her two passions

Meghan Heavener, first-year MBA student and senior in industrial engineering at Iowa State University, is combining engineering with business to achieve her goals.

The MBA program only added one year to her degree program, but she hopes that it will add a lot more to her skillset.

"I realized that I was interested in learning more about business and how the things I learned in industrial engineering can be used in collaboration with business to make a positive impact on the company's bottom line," Heavener said.



Heavener

## Combining degrees for a unique goal

Heavener aims to be in a management role after a few years of work, particularly dealing with complex supply-chains which require a higher level of engineering and business involvement.

According to Heavener, a good manager is well-rounded with technical, financial, accounting and supply chain knowledge, as well as the ability to guide engineers and resources properly.

"As a future well-rounded manager, I'll be able to use my expertise to properly prioritize company focuses to have the most impact on their bottom lines using what I'm learning as a concurrent MBA student," Heavener said.

Heavener's current career goal is to get involved in business consulting someday, which will use her engineering expertise to solve problems while exploring business concepts and solutions.

"I think there are many career avenues that engineering, problem-solving and business knowledge can help you with," Heavener said. "I'm planning to use my MBA to branch out and see what other areas I can combine both degrees to excel in."

## Gaining experience to jumpstart aspirations

To that end, Heavener interned in manufacturing engineering at Altec Industries last spring and summer in St. Joseph, Missouri.

In that position, Heavener worked on resolving production floor issues and reallocating resources. In addition, she worked on quality and 5S projects, including the creation of a hood to collect dust from maintenance cleaning of three laser chillers and prevent the dust from blowing into the factory.

Heavener found this position at the engineering career fair and loved the culture they promoted.

Heavener led four weeklong projects, called RCI events, for her first internship in which the teams would focus on one manufacturing problem and find solutions to resolve them and reduce waste.

"I learned a lot about teamwork and leading a team," Heavener said. "It was my first position where I got experience in motivating a team to do work that might not be easy."

## Transferring to Iowa State

As a transfer student from another university, Heavener appreciates the welcoming environment of Iowa State University.

"Iowa State has a culture of wanting to help you," Heavener said. "Here, I feel like my teachers are wanting to help me and wanting me to learn, rather than trying to weed me out."

On campus, Heavener is currently a peer mentor for the IDEAL transfer learning community, running Engineering 101 for transfer students and study hours, and an ambassador of the MBA program and the industrial engineering department, setting up presentations to promote the programs to prospective students.

"The Department of Industrial and Manufacturing Systems Engineering is an accepting and encouraging environment, even though I transferred here as a junior," Heavener said. "A lot of times, people might feel set back as a transfer student, but getting involved and being welcomed at Iowa State eliminated that problem for me."



# Student meshes IE with entrepreneurial studies for an unconventional goal

Allison Theisen, a recent industrial engineering (IE) graduate, diversified her undergraduate degree program at Iowa State University with an entrepreneurial studies minor.

As the director of social enrichment for her sorority, Alpha Delta Pi, Theisen planned a lot of different events for about 300 people, and she found that the social and planning aspects of the job appealed to her.

Theisen always wanted to pursue a business-related engineering position but found that event management was also appealing to her and that opening her own events center someday would be a dream come true.

Rather than changing her major half-way through, Theisen added the entrepreneurship minor to continue pursuing both goals.

"I have a passion for leadership, and being my own boss is very enticing to me," Theisen said. "Meshing these two majors allows me to take the foundation that I've learned in both majors and apply them to the other."

"I'm one of the only IE students pursuing that minor," Theisen said. "Most people who want to go into business engineering go into sales, but there are definitely more options."

## Learning from experience

Theisen has interned with Busch Construction, in construction engineering, John Deere, in supply chain, and, mostly recently, HNI Corporation, a furniture manufacturer out of Muscatine, Iowa — a position that she discovered at the Engineering Career Fair.

In fact, much of the furniture in the College of Engineering's own Marston Hall came from HNI.

At HNI, Theisen's main project was to relocate an assembly line in an area that hadn't been paid much attention in the past few years.

"I had the freedom to do whatever I wanted with it, and everyone supported the ideas that I had," said Theisen. "I had really good guidance throughout the project."

Theisen was able to use this experience as her independent study credit for her entrepreneurship minor because of the flexibility of the position. This work allowed Theisen to use her engineering skills while innovating and using entrepreneurial skills to guide her.

"I really got the chance to explore my own skills and how they cross over to the two different fields," Theisen said.

## Impact at Iowa State

In addition to heavy involvement in her sorority, Theisen was involved in Iowa State's Dance Marathon, Circle of Sisterhood and was an IDEAL Peer Mentor for freshmen beginning their engineering education.

In her position as a peer mentor, she was an assistant for about 10 students of Engineering 101.

According to Theisen, assisting young engineering students is very rewarding and points students in the right direction.



"Professionalism and communicating what you're trying to say in an effective manner has always been taught by my professors," Theisen said. "They set students up for success and really allow us to build technical and professional skills. As a peer mentor, I get to pass those skills on."

To further diversify the foundation of knowledge, the IE department teaches courses across a variety of disciplines to give students experience across the board, according to Theisen.

"There are a lot of different focus areas in IE, and we're given classes to really test those out," Theisen said. "Although I haven't loved all of them, it's given me a really good taste of what I do and don't like, as well as the problem-solving foundations that go along with it."



Theisen became president of Alpha Delta Pi, after serving in other leadership roles in years prior.

"It's a chapter of 170 women, so you get a lot of different personalities, interests, involvement levels, and that's taught me a lot about how to interact with people, which definitely helps," Theisen said.

After graduation, Theisen was hired by Post Consumer Brands, a cereal manufacturer headquartered in Lakeville, Minnesota. She is part of their operations leadership development program, a two-year program consisting of four six-month rotations. Her first rotation is as a quality food safety scientist at their facility in Battle Creek, Michigan, where she will be located for the first year.

# Cyclone Engineers elected as Trustees for the IISE Board

Two Cyclone Engineers have been elected to the leadership team for industrial engineering's largest professional society.

Gül E. Kremer, professor and C.G. "Turk" & Joyce A. Therikildsen Department Chair of Industrial and Manufacturing Systems Engineering (IMSE), and Carl Kirpes, a PhD student in industrial engineering, have both been elected to the board of trustees for the Institute of Industrial and Systems Engineers (IISE). Kremer will serve as senior vice president (SVP) for international operations while Kirpes will serve as the SVP at-large representative from industry.

Kirpes earned his BS in both industrial and mechanical engineering in 2012. As an undergraduate he was a linebacker on the Cyclone football team under head coach Paul Rhodes. The West Des Moines native completed his Masters of Engineering (MEng) in Systems Engineering in 2014 while working full-time as the vice president of operations for GENESYS Systems Integrator in Kansas City, Missouri. He served as chair of IISE's industry advisory board from 2015 to 2018, during which time he focused on developing closer relationships between industry, academia, and the student community to "deliver greater benefit and value to all stakeholders."



Kirpes

"Through engagement, relationship building and focused initiatives to align the efforts of these three groups, industry members are better served with beneficial research and access to better prepared students," said Kirpes. "Additionally, academia is better able to market their capabilities to industry, and students are better prepared to contribute more effectively in the workforce."

In his new position as the SVP at-large representative from industry, Kirpes said he "will continue to foster and facilitate these connections within IISE, while establishing and connecting IISE more broadly, expanding our industry membership and engagement." Kirpes, who currently works in crude oil strategy and analysis for Marathon Petroleum Company in Findlay, Ohio, added that he hopes to take the skills and knowledge that he developed as an engineering student at Iowa State and apply them to his position on the IISE board of trustees.

"While at Iowa State I coined a concept called reflective leadership, through which an individual grows as a leader in part by mentally optimizing previous leadership experiences and then implementing those approaches," said Kirpes. "As the IISE SVP of industry, I look forward to serving the industrial and systems engineers across industry and academia via helping others recognize their strengths, reflecting on what works well and using that knowledge to further foster and facilitate connections to IISE."

Though his playing days are behind him, Kirpes said much of the teamwork mentality that he developed as a student-athlete applies to the work he does today.

"I am a true believer that individuals' strengths provide the potential, but teamwork creates the results. While at Iowa State, I had many professors, coaches, mentors, and friends with whom I was able to achieve great things. I have no doubt that the same will be true for my role as the IISE SVP of Industry. The success of the role will not be determined by what I do in the next three years, but by the aggregate of those who engage with IISE to transform industry and academia," Kirpes said.



Kremer

Kremer said that international experiences have been beneficial to her professional development and she hopes to use these experiences so she can give back in her position on the IISE board of trustees.

"As a teacher and a scholar, I benefited from my international experiences throughout my career," said Kremer. "Engineering is global today; naturally, exchanges across borders on new ways to take our

knowledge and professional practice to the next level will benefit us all. I am committed to being a cheerleader for IISE in enabling connections, collaborations in service to our profession."

Kirpes and Kremer's appointments began on April 1, 2019 and will continue through March 31, 2022.



# ISU moves up four spots in latest grad program rankings



Iowa State University's graduate program in industrial and manufacturing systems engineering climbed four spots from last year, according to the latest rankings from U.S. News and World Report.

The 2020 Best Graduate School Rankings gave Iowa State's IMSE graduate program a score of 3.0 (on a scale of 5.0) which ranks 24th nationally, tied with the University of Arizona, University of Pennsylvania, and Clemson University. The 2019 rankings placed ISU in a tie for 28th.

Ninety-one industrial engineering programs were surveyed in the 2020 rankings which were based solely on peer

assessments by IE and IMSE department heads across the nation.

"Our goal is excellence in all aspects of our work, research, teaching and service to the profession," said Gül E. Kremer, Therikildsen Chair and professor. "Based on my analysis, I associate the increase in our research productivity to the upward move in rankings. I am grateful for the synergy in our department; results such as this are not possible without faculty, staff and students working towards the same vision."

Iowa State's overall College of Engineering graduate program rank climbed from tied for 43rd in 2019 to tied for 41st in 2020.



# Three IE students part of champion broomball team

Three industrial engineering students were part of Iowa State's champion intramural broomball team which nabbed the title during fall 2018.

Those students were Audrey Fyock, a student in the concurrent BS in IE / MBA program; Courtney Middelkoop, a first year student in the IE master's degree program; and Ashley Swift, a student in the concurrent BS and MS in IE program.

For those unfamiliar with the unique sport, Middelkoop offers a succinct explanation.

"Broomball is basically hockey but without ice skates, a hockey stick and a hockey puck. You wear your normal shoes and hit a little soccer ball with a broom-like stick. It's fun," she said.

Middelkoop earned her BS in IE from Iowa State and was part of the Cyclones gymnastics team as an undergraduate. She was also on the track and diving teams as a high school student in Richardson, Texas. She said her father was an industrial engineer and that he influenced her decision to study IE.

"When he would come home from work, he would always tell me about the things he did. By the time I was deciding what to study, IE was familiar to me and it made sense," Middelkoop said.

Middelkoop plans to complete her degree in fall 2019 and after graduation hopes to use her IE skills to pursue a career in the sports industry, focusing on improving the manufacturing side of equipment and human performance interaction with the equipment.

The broomball team won five-straight games en route to the championship, and clinched the title with a 2-1 victory. Fyock said that many of the team members did not know each other prior to this season and that for many of them this was their first time playing the sport.

"We had a lot to learn in the first few games. With that, we still had good chemistry. Three of us were IEs and the rest of the team was studying other STEM majors. This



*Three industrial engineering students were part of Iowa State's Fall 2018 champion intramural broomball team.*

helped us strategically think about our game plan for each game: like who played what position, how we handled substitutions, and so on."

Swift grew up in Bondurant, Iowa, and her decision to attend Iowa State was influenced by her parents, both of whom are ISU grads, as well as her desire to be part of the Iowa State University Cyclone Football 'Varsity' Marching Band.

"Iowa State stuck out to me because of its quality engineering program and its well-respected and unique marching band. I chose to study industrial engineering because I have always had a passion for math and loved the idea of being able to use my interests and ideas to make individuals' lives safer or simpler," Swift said.

In high school she was active in marching band and also ran cross country and played soccer, which she said has parallels to broomball.

"I understood positioning and could translate a lot of that sport to broomball."

Swift graduated in May 2019 and was hired as a manufacturing engineer in the career development program for HNI Corporation.

After winning the championship, Fyock described her feelings as "jubilation."

"I jumped up and down," she said. "Very carefully, though, because I didn't want to fall down on the ice."

Fyock grew up in Creston, Iowa, and said she was "born to be a Cyclone."

"My dad went to Iowa State, so we would always root for the football and basketball teams growing up, occasionally coming to a few games. I just always knew ISU was where I needed to be, without ever taking a tour or anything," she said.

Much like her teammates, Fyock was an active student-athlete in high school, participating in tennis, volleyball, softball and basketball. Since coming to Iowa State she has added badminton, golf and pickle ball to her sporting repertoire.

Fyock came to Ames as an undecided engineering major but soon selected IE because of the broad career opportunities it offers. She completed her studies in the spring and hopes to pursue a career in either the athletic or healthcare industries after graduation.

"Thanks for a great five years," she said. "It's been the best time of my life."



# IE student's summer involved singing in Norway and engineering in Virginia

One industrial engineering student was busy during summer 2018 with two of his biggest passions: music and engineering.



**Low**

Samuel Low, a recent industrial engineering (IE) graduate, started the 2018 summer off by touring Norway with the Iowa State Singers, a 72-member mixed choral ensemble consisting of students from various majors across campus. The group

visited a handful of Norwegian cities during their recent tour including Oslo, Bergen, Førde, Grodas, Molde and Trondheim as well as some of the country's natural wonders including the Geiranger Fjord and the Olden Glacier.

"The trip to Norway was amazing and a once in a lifetime experience," said Low, who is originally from Malaysia but also lived in China and Iowa growing up. "The members of the choir got to bond as friends and as a choir."

The group's repertoire consisted of more than 10 songs, including "Give me Hunger" by contemporary American composer Jake Runestad and "Tafellied" by Johannes Brahms, the German-born Romantic period composer. Low, who sings Tenor I, first got "seriously involved" with music when he joined the choir his sophomore year at Ankeny High School and said that his family both influenced and encouraged him to pursue his musical endeavors.

Low's family, and specifically his sister Yunnie, influenced his decision to study industrial engineering at Iowa State. Yunnie graduated from Iowa State with her BS in IE in 2011 and encouraged her younger brother to follow in her footsteps.

"We are very different in personality, but she pointed out that we were both similar in that we can be very analytical and have a good eye for pointing out errors in systems," Samuel said, adding that Iowa State's strong reputation and the fact that he was a recipient of the George Washington Carver Scholarship also factored into his decision.

Low spent the latter part of the past summer in eastern Virginia where he worked as an industrial engineer intern at Smithfield Foods' North Plant. He worked on a variety of projects related to yield improvement, labor reduction, throughput guides, equipment testing and standardizations.

"My projects throughout the 10 weeks ended up saving the company about half a million dollars annually, and I presented what I worked on and my results to many people in the company including top executives during a presentation day," he said.

Low returned to Ames and graduated in May 2019. He hopes to stay involved with music after graduation and said he actually sees similarities between the two seemingly different fields.



*Samuel Low and other members of the Iowa State Singers visited Olden Glacier during their tour of Norway. Photo courtesy of Samuel Low.*

"I think there are similarities in engineering and music in how learning and performing music require an active mind and active listening. I think that working as an engineer requires you to always be thinking and innovating, as well as being an active listener, as listening is arguably half of the job," Low said.

He said that music always served as a form of stress release for him, particularly with the rigorous IE course load coupled with all of the other demands of being a college student.

"It lets me drown out the world for an hour every day during the week," he said. "I honestly can't imagine what my life here would be like without the Iowa State Singers."

Low hopes to find a job in either Denver, Colorado, or Orlando, Florida, so that he can live near siblings that he has in both of those cities. Regardless of where he ends up, he hopes to be involved with either a community or church choir so that music can continue to be a major part of his life.

For incoming or current engineering students who have a demanding schedule but also want to be involved with music, Low offers some advice.

"I think doing engineering and music is possible as long as you keep up with your studies and have good scheduling habits. There are many different ensembles at Iowa State such as the orchestra and the Iowa Statesmen. It can be hard to schedule classes, so looking up all the times those ensembles meet during the week can really help figuring out what you are able to do."

*Samuel Low, front row third from left, poses with other members of the Iowa State Singers inside Nidaros Cathedral in Trondheim during their Norway tour. Photo courtesy of Samuel Low.*





# IE student spent summer interning at Tesla

Thomas Berquist, a sophomore in industrial engineering (IE), spent summer 2018 in Sparks, Nevada, working as an engineering project management intern at Tesla where he served on the new product introduction team for the Model 3 battery.

"This team was involved in launching new products, material cutovers, design changes, process changes and new line layouts. I was involved with the coordination of cross functional teams to manage launches between all lines and engineering teams throughout the plant. One of my main projects was the validation and cutover to an internally procured battery component for an annual savings of nine million dollars," Berquist said, adding that a non-disclosure agreement prevents him from discussing his work in further detail.

Berquist was also involved with projects surrounding the Model 3 short range battery pack. After countless hours working on the project, Berquist said he had three major takeaways from his summer internship.

"One was the technical analysis skills that I gained from being on the lines to troubleshoot and learn how they work. Another would be learning how to balance the sheer workload of a 60-hour week. The first week at Tesla was like drinking from a fire hose and one common thing they say there is that a month at Tesla is like a year anywhere else," said Berquist. "Probably my biggest takeaway was the management experience. Being able to be in charge of such a mission-critical project and directing multiple teams of engineers to coordinate and launch a completely new product throughout multiple lines in the factory was invaluable."

Berquist added that he was able to take the optimization and management skills that he learned in the IE curriculum and apply them to his internship.

Growing up in Plymouth, Minnesota, Berquist developed an interest in engineering through math and science classes as well as his desire to take things apart to find out how they work. In high school he joined a FIRST LEGO League team which formally introduced him to basic programming and the STEM field more broadly.

When it came time to select a college, his decision was largely influenced by his two older brothers, Mark and



*Thomas Berquist, a sophomore in industrial engineering, poses at Tesla's Gigafactory in Sparks, Nevada, where he worked as an engineering project management intern last summer. Photo courtesy of Thomas Berquist*

Paul, who both graduated from Iowa State and studied mechanical engineering and industrial engineering, respectively. Mark now works as a consultant for Optum advisory services payer consulting group in the payment integrity division while Paul is an experienced associate for capital projects and infrastructure at PricewaterhouseCoopers.

"Iowa State was a clear choice based on its strong engineering program as well as its renowned career fair. I chose industrial engineering because I knew I wanted to go into engineering management and consulting, focusing more on the business side of engineering," Berquist said.

Thomas Berquist plans to graduate in the spring of 2020. He already has full-time job offers but hasn't made a final decision yet. When considering the opportunities that Iowa State's industrial engineering program has opened up for him, Berquist recommends IE as a major for any incoming student who has an interest in engineering.

"What is great about industrial engineering is the sheer amount of opportunities that are available to you. People love having industrial engineers work for them because of the way they train us to think, the way we are trained to look at a large problem and optimize and analyze it. We also get a nice taste of the business and management sides of engineering which is great if you want to take the path of corporate engineering management."

*All three Berquist brothers are alums of Iowa State's College of Engineering. From left: Mark, Thomas and Paul. Photo courtesy of Thomas Berquist*



# Cyclone Engineering alum Marlin Fischer: From Iowa State to Tinseltown

When 61-year-old Marlin Fischer graduated from Iowa State in 1980 with a BS in industrial engineering, a black belt in Tae Kwon Do and membership in Sigma Alpha Epsilon fraternity, his adventure didn't stop there. It was just beginning.

Fischer sought industrial engineering positions after graduation and landed one in Seattle, Washington.

But with a troubled economy in the early 80s, Fischer was laid off multiple times from industrial engineering jobs, including positions in Seattle and Portland, Oregon and as a teacher of industrial relay-logic computers to plant engineers at Boeing, Continental Can, Georgia Pacific, Weyerhaeuser and others.

## No biz like show biz

Fischer's path took an unexpected turn when a woman approached him at a restaurant bar on a Friday afternoon asking, "Are you a model?" This had happened to Fischer multiple times, but this time was different.

The woman had connections with a modeling agency and got Fischer his first modeling audition.

Curious about where it would lead, Fischer gave it a shot and landed a position as the spokesperson of John Robert Powers modeling agency in Boston, Massachusetts.

"Iowa State grew my ability to be confident and explore new opportunities," Fischer said. "Don't be afraid to make changes or do more than what is expected of someone with your degree. You never know where life will take you."

Fischer flew to Boston for a week-long photoshoot, and his photos appeared in various magazines and billboards across the country, including Glamour, GQ, Seventeen and Esquire.

After finding success in modeling, Fischer wanted to do something with a little more substance and action, so he thought he'd try his hand at acting.

"I was always pretty good at public speaking, but Iowa State taught me to solidify my means of expressing myself," Fischer said. "I grew in confidence through my courses at Iowa State and my position as a computer program teacher for industrial engineers."

Fischer drove to Los Angeles and began to pursue an acting career, landing roles in "Days of Our Lives," "The Young and the Restless," "Capital," and some movie parts, including the role of Ron Hubbard in "Force of Darkness" (1985).

He also played Bill in "Dynasty" (1987), an ABC soap opera, where he worked with Heather Locklear in her first major television role and Officer Simon on an episode of "Jessie" (1984) with Lindsay Wagner, better known as "The Bionic Woman."

Fischer only told his parents back in Iowa about his acting career, but would get calls from friends saying, "I saw you on TV!"

During his time in Hollywood, Fischer crossed paths with some of the "greats," including Marlon Brando and Sofia Loren, and had a close relationship with Francine York. He was even praised for his snappy fashion taste on the red carpet by Richard Blackwell, renowned fashion critic and designer, commonly known as "Mr. Blackwell."



Fischer played other semi-recurring roles throughout his career in LA, as well as commercial and advertising parts for Western Airlines and Tri-State Honda, New York, which earned him royalties for about a year.

"Pursuing an acting career is a tough business," Fischer said. "I had a lot of fun while I was working, but you're taking odd jobs and more simplistic things just to get the chance to get noticed."

Fischer said that the lyrics to Piano Man by Billy Joel is a perfect depiction of what Hollywood is like, saying that many people work themselves to the bone and never get their break.

It's not all famous girlfriends and VIP rooms, according to Fischer, although those were some benefits of his acting career. He also served as a "limo driver to the stars" when times were slow, driving people such as Whoopie Goldberg, Jennifer O'Neal, Boy George and more.

"I know a lot of people never get that chance that they're hoping for, so I feel fortunate to have been given that chance and that I got to experience all that I did in those 10 years."

## When one curtain closes, another opens

Fischer moved on from show business in 1993 and decided that "the computer stuff isn't going away." He was given the opportunity to sell a New Zealand product in the U.S., Krystal Air, and this led to a new adventure.

In an age where internet sales were just beginning to take off, Fischer had success selling the product all over the world, including in Japan, Korea, Germany and Canada.

When the company was sold to another corporation, he was offered a position as a cyber security analyst for the U.S. Army in the Middle East, which led to several positions after that.

Fischer now lives in Huntsville, Alabama, where he works for the Department of Defense's Missile Defense Agency as a cyber security analyst on the Redstone Arsenal, a field that he sees rapid growth in.

"Always look for opportunities to improve yourself. You're never going to stop learning," Fischer said. "Getting my degree at Iowa State gave me a mindset of deducing problems, which has helped me throughout my career."

His certifications, including a CISSP, Security+ and MCP, give him some of the highest clearances in the Department of Defense.

"Nothing is ever done in vain. Nothing is ever worthless. Even though I'm not in an engineering position, I understand things more thoroughly with the technical knowledge that I learned at Iowa State," Fischer said.



Fischer continues to get job offers even now and stays active on sites like LinkedIn. According to Fischer, exposing yourself to as many people and opportunities as possible is the key to finding new paths.

"Keep your eyes and ears open, stay ahead of the curve and understand that good opportunities are there for those who aren't afraid to take risks and adjust to change," Fischer said.



# From the blue skies of Iowa to the skyscrapers of New York

An industrial engineering alumna has taken the skills she learned at Iowa State and is now applying them to the fashion industry in the Big Apple.

Casey Waechter grew up in Cedar Rapids, Iowa, and looked at schools in both Iowa and Chicago when it came time for college. Ultimately she picked Iowa State.

"I came to Iowa State for many reasons," said Waechter. "It's a great school with a wonderful engineering program, but another big part of what sold me on Iowa State was that when I visited, I fell in love with the campus and really felt at home with the people I met."

She came in undecided on a major, but knowing she wanted to go into some field of engineering. By the fall semester of her sophomore year she decided that industrial engineering was a good fit.

"Industrial engineering has a great balance of technical education and easily transferable real-world skills," she said.

Part of the reason she selected IE was because of the department's strong and devoted faculty, specifically Frank Peters, C. G. "Turk" and Joyce A. Therkildsen Professor in Industrial and Manufacturing Systems Engineering, and Leslie Potter, senior lecturer.

"I remember Dr. Peters' passion for process improvement and efficiency. He gave examples of ways to implement things around the house. In an effort to simplify my morning routine, I still keep my sugar in a shaker on the counter versus a bowl in the cabinet," Waechter said.

"Leslie Potter served as an important role model for me as I started my transition from school to full-time employment," said Waechter. "During her capstone class, she treated us and expected us to behave like professionals."

After graduating with her BS in IE in 2005 she was hired as a manufacturing engineer at Procter & Gamble (P&G) in Iowa City. She began taking night classes through the University of Iowa's MBA program in 2006, which in some ways built upon Iowa State's IE curriculum.

"The Iowa State IE program prepared me with knowledge and a set of problem solving skills to apply. Comprehensive problem solving has been important in every role I've had throughout my career," she said.

She relocated to P&G's Baltimore office in 2008 and worked there until 2016 when P&G's beauty brands merged with Coty, "a global beauty company making cosmetic, skin, fragrance & hair brands." At this time, she moved to New York to serve as initiative



leader of Covergirl for Coty with an office in the Empire State Building. Then in June she was promoted to director of global Sally Hansen initiatives for Coty. In this role she works with a cross functional team – including marketing, finance, research and development, packaging, and manufacturers and suppliers – to develop and bring to market innovation for the Sally Hansen brand.

"Our innovation and range is wide – nail color, treatment and skin – so we get to create new shades, stories or ingredients on trusted franchises and deliver major beauty breakthroughs," said Waechter. "The beauty industry is fast paced and fun. Capturing the hearts of beauty consumers requires new products that deliver on a promise and are in touch with needs and trends of the markets we serve."

Outside of work, Waechter enjoys all the fine arts the city has to offer, particularly theater, music and dance. She also likes traveling and considers Cuba and Italy two of her favorite places she's visited. She keeps the Cyclones close to her heart by following the football and basketball teams and is also an avid fan of the Baltimore Orioles because of her time living in the Charm City.

Even though Waechter is now more than 1,000 miles away from her alma mater, many of her college memories remain with her.

"One of my fondest memories from my time at Iowa State was my junior year when I served as the co-chair for the Engineer's Ball during E-Week. We had such a great time planning, executing and participating in the event. It's a great memory I'll carry with me," she said.

Waechter has reflected on her time since roaming the halls of Iowa State and offers two bits of advice for young people today. Her first is for incoming college students who might have an interest in engineering but aren't sure what exactly they want to study.

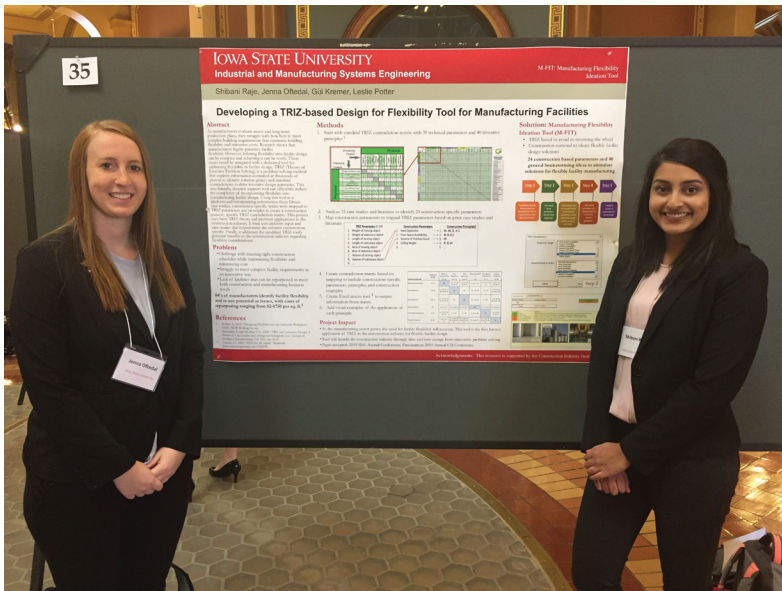
"Work hard and pay attention in class, find people who you work well with and who will push you to be your best," she said. "Additionally, join student groups that interest you outside of class. I learned great lessons both inside and outside of the classroom in a variety of student groups."

Her second piece of advice is for recent IE graduates or those who will be graduating in the near future.

"Learn the industry, listen to your colleagues, ask lots of questions, follow the data and don't shy away from big projects."



# The year in photos



Above, left: IE students Jenna Oftedal (left) and Shibani Raju presented their research during Research in the Capitol on April 1, 2019.



Above, right: Despite long lines, students were more than willing to wait to get free food during the IMSE fall picnic on Sept. 12, 2018 in the Black Engineering Building Courtyard.



Right: The Industrial Engineering team had a booth at the Engineering Scholars Day in Howe Hall on Feb. 23, 2019.

Below: Students and faculty pose during the annual IMSE volleyball tournament at the Lied Recreation Athletic Center on March 7, 2019.







Above, left: C. G. "Turk" Therkildsen (second from right), an IE alum, and Joyce Therkildsen (left) received the Joseph K. Walkup Prominence in Engineering Award during the IMSE Honors and Awards Luncheon at the ISU Alumni Center on April 26, 2019. The Therkildsens have endowed a chair position (held by Gül Kremer, right) and a professorship (held by Frank Peters, second from left) within the IE department.

Above, right: All six children of longtime IE faculty member Don Grant pose with Matt Frank (center) after Dr. Frank received the Don Grant Faculty Award during the IMSE Honors and Awards Luncheon at the ISU Alumni Center on April 26, 2019. This year would have marked Don's 100th birthday.

Left: Val Boelman, an IE alum, poses with IMSE senior lecturer Leslie Potter (right) after receiving the Joseph K. Walkup Prominence in Engineering Award during the IMSE Honors and Awards Luncheon at the ISU Alumni Center on April 26, 2019.

Below, left: Graduate and undergraduate students pose during the 7th Annual IMSE Undergraduate and Graduate Research Symposium on April 25, 2019 in the Howe Hall Atrium.

Below, right: Once again, long lines to not deter hungry college students from waiting for free food. The department hosted its spring 2019 Welcome Back Lunch in the Black Engineering Building on February 6.





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