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College of Engineering and Applied Sciences

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Innovation Club offers space to create

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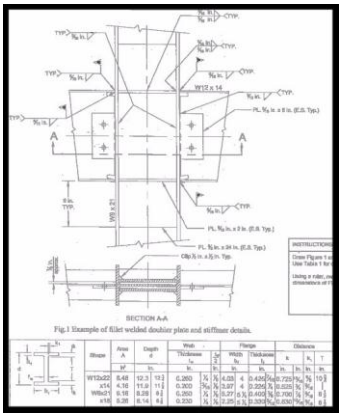
Read Full Story



Urdarevik helps students get the picture

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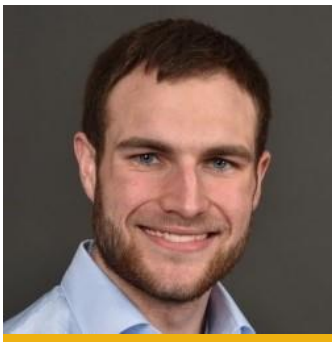

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Innovation Club offers space to create

Got a product you're designing? An experiment in mind? A prototype you want to develop? WMU's new Innovation Club has space, equipment and people to help you tinker, test and try out your ideas.

"We wanted to create an open, accessible space where people can learn," said Mac Preston, a mechanical engineering senior and president of the Innovation Club, a new registered student organization. A makerspace, ideation space, hackerspace – call it what you will, it's a place to experiment, create and design.

The club operates in two locations. The larger of the two spaces is at the WMU hangar at the Kalamazoo-Battle Creek International Airport, formerly the site of WMU's aviation program. Currently it is open for students to use on a project to project basis. Equipment there includes woodworking and metalworking equipment, hand tools, benches and a paint booth. New equipment is being added all the time.

"We can change how the space is used based on how people want to use it," Preston said.

A second space is located within the University Computing Center attached to the WMU library. Here, would-be inventors and innovators can use 3D printers, rapid prototyping supplies like popsicle sticks, string and electronics to work the bugs out of their designs. Innovation Club members recently built their own 3D printer and now are working on 3D printing drones. The center is open Monday – Thursday from 6 to 9 p.m.

"With these spaces, we want to spur people's imagination and expose them to technology they might not see elsewhere," Preston said.

He said while many of the club's 20 or so members are students in the College of Engineering and Applied Sciences, the club is open to all. "We'd love to have students from the business school, from fine arts, from across the university, get involved in the club or just take advantage of the space," Preston said.

Through October, there is no fee to use the space, which can be for university-related projects, and for personal and recreational projects as well. After October, a nominal charge may be introduced to fund upkeep of the tooling.

For more information, contact Mac Preston at iclubwmu@gmail.com.

Urdarevik helps students get the picture

Model to help students easily visualize what's in the diagram to aid in learning.

What do you make of the diagram on the left? Can't quite envision what it is or what it would look like when built? You're not alone. It can be difficult to look at something in two dimensions and visualize it in three. But visualization is critically important to success in engineering. Master faculty specialist Slobodan Urdarevik, who teaches engineering graphics, wanted to find a way to make that easier for his students.

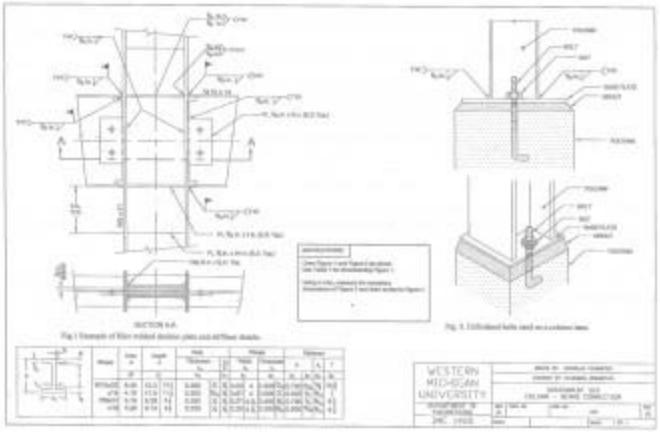


Diagram used in teaching.

Urdarevik said he realized several years ago that the majority of his engineering students were having difficulty with visualization and were not always capable of seeing the interior features of parts. His engineering graphics class, EDMM 1420, is a required course for many engineering disciplines and usually taken during the freshman year.What do you make of the diagram on the left? Can't quite envision what it is or what it would look like when built? You're not alone. It can be difficult to look at something in two dimensions and visualize it in three. But visualization is critically important to success in engineering. Master faculty specialist Slobodan Urdarevik, who teaches engineering graphics, wanted to find a way to make that easier for his students.

Slobodan Urdarevik

"Visualization tends to be a problem for many engineering students," he said. "Describing 3D information on paper is not very effective. Yet visualization is so important for success in engineering careers. In manufacturing, in construction, in assembly -- you need to know what kinds of tools are needed, what specific type of hole or slot you are dealing with, how pieces and parts will fit together – and how to visualize it all."

Urdarevik created a set of models that helps students see the inside of a part through a variety of different views. The models come in all shapes and sizes – showing sections, joints and connections of columns and beams. Some display full, half, offset, broken out, aligned, revolved, removed, assembly or auxiliary sections.

Now he focuses on teaching with his engineering models as the most effective teaching tool in helping students to solve visualization problems.Urdarevik created a set of models that helps students see the inside of a part through a variety of different views. The models come in all shapes and sizes – showing sections, joints and connections of columns and beams. Some display full, half, offset, broken out, aligned, revolved, removed, assembly or auxiliary sections.

"It's hard to understand the workings of a part when you are looking at a page in a book," he said. "Being able to touch the models, manipulate them and explore their features and surfaces engages the students in the learning process. At the same

time students are fully engaged in the learning process and gain the knowledge they need for subsequent courses that require good visualization skills."

He said surveys show the students find great value in having the models to help them and felt their grades improved as a result. "It makes their work easier and faster, they do well and it gives them the confidence to handle other challenging subjects," he said.

Other schools using the models also have provided excellent feedback. Urdarevik said introducing use of the models earlier -- in high school or even middle school – may encourage students and help them realize they can be successful in the field of engineering.

"There's just no substitute for physical models," he said. "Pursuing a degree in engineering can be daunting. I'd like to think I'm helping contribute to our national effort of attracting more students into the engineering pipeline in one small way."

The visualization method offers benefits for teachers as well, he explained. "Using models means less preparation and lecture time for teachers, and test results are superior to those achieved from teaching from a textbook."

Urdarevik has shared his teaching strategies using models with colleagues in the field. He has presented his findings at numerous conferences including the 2014 Education STEM Conference, 2013 ASQ Advancing the STEM Agenda Conference and to the Michigan Academy of Science Arts and Letters, among others.

Let the sun shine

Photo of a solar panel in front of CEAS

The Consumers Energy solar array at Western Michigan University's College of Engineering and Applied Sciences now is up and running, transforming 8.5 acres at the Parkview campus into a new source of renewable energy for Michigan.

The 1-megawatt solar power plant on WMU's property is Consumers Energy's second large-scale solar project in Michigan. A 3-megawatt solar power plant opened at Grand Valley State University in April.

"This outstanding project is good for our region, our state and our residents," said Dr. Houssam Toutanji, dean of the College of Engineering and Applied Sciences. "But it also provides an excellent learning opportunity for our students and faculty."

As part of a partnership with Consumers Energy, the college received two grants that support solar energy education.

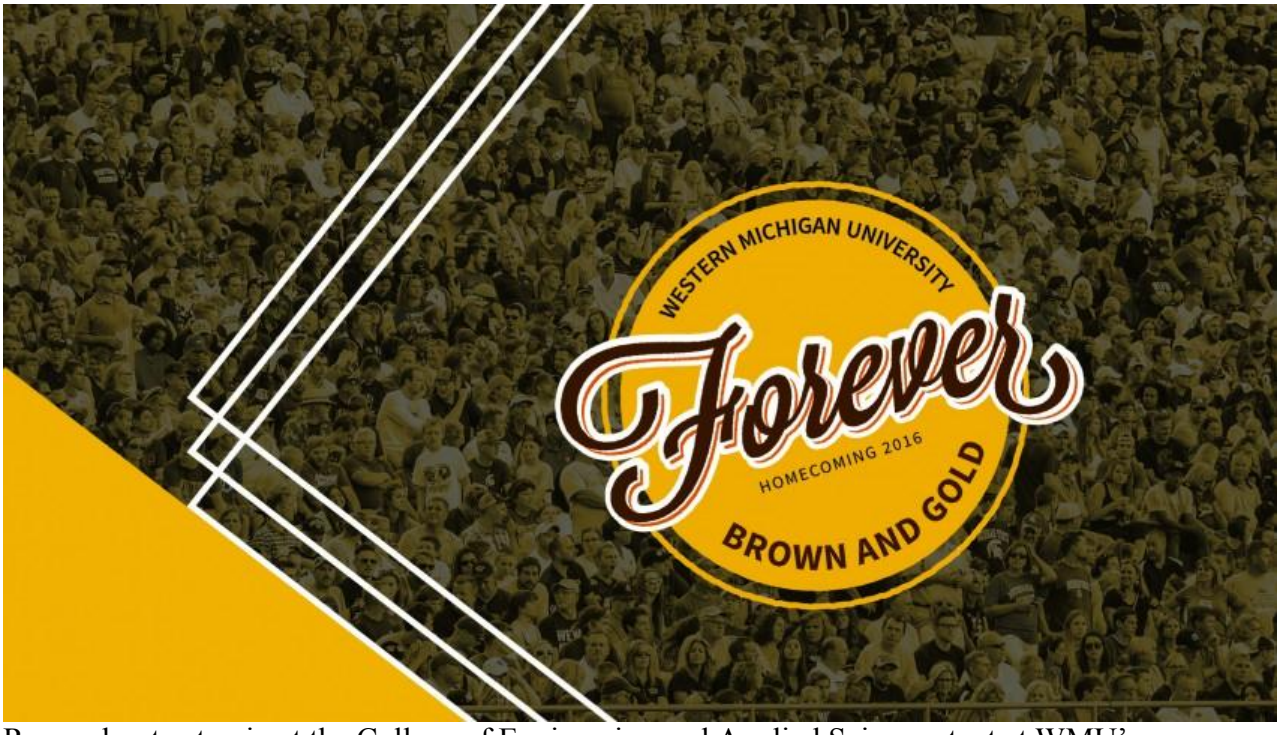
Funding of $120,000 over six years will be used to prepare and present Solar Learning Modules that will be used to educate WMU students as well as educate and inspire students in grades K-12 about solar energy. It will also be used to educate community groups with initial learning modules focusing on firefighter and first-responder training and safety when encountering solar arrays.

The college also received a $55,000 grant from Consumers that has allowed it to construct two smaller solar arrays in a WMU educational solar garden. “Our students and faculty will use these in research and education, collecting and using data from the educational arrays,” said Dr. Brad Bazuin, associate professor of electrical and computer engineering who has been closely involved in the project.

“Groups will be able to get up close and even hands-on with the array’s elements and electrical components,” he said. “We’ll be offering free educational seminars next summer too.”

Toutanji said the public-private partnership is an excellent way to learn about alternative energy and shows the college and university’s commitment to sustainability.

See you at Homecoming



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see the college's concept vehicles, and play for prizes in an updated version of the Game of LIFE, tailored just for Bronco engineers.

Western's official Stampede Pre-Game Tailgate is expected to draw nearly 5,000 alumni and fans to campus before the Broncos take on the Northern Illinois Huskies at 6:30 p.m.

The pre-game tailgate is 3:30 to 6 p.m. in Lot 1 at Heritage Hall off Oakland Drive. Tickets are $15 for adults, $5 for children 12 and under. Admission to the Stampede Tailgate and game tickets can be purchased by calling the Bronco Ticket Office at

1-888-4-WMU-TIX or go to TICKET PORTAL

Springstead's research on immune systems published in Science

Dr. James Springstead

Dr. James Springstead, assistant professor of chemical engineering, recently worked with Dr. Jon Kagan, an associate professor at Harvard, and several other worldwide collaborators to determine the mechanism by which oxidized phospholipids hyperactivate the immune response. Oxidized phospholipids are oxidation products of phospholipids that are found in all cell membranes and other lipids particles in the human body. Their findings have been published in the prominent journal Science.

Springstead's main projects focus on developing novel treatments and determining new measures for determining the risk of heart disease. Through his studies, he and his collaborators have determined that oxidized phospholipids play a prominent role in the development of heart disease.

In their study published in Science, Kagan and Springstead report that oxidized phospholipids also have the ability to "hyperactivate" the immune system and may be useful in developing hyperactive vaccines. "These results are extremely important in the push to utilize the body's own immune system in the fight to treat disease," Springstead said. "We hope that this work will lead to novel vaccines and other treatments in the near future."

Ph.D. graduate to receive Best Dissertation award

Dr. Nolen Akerman

Nolen Akerman, a 2015 Ph.D. graduate in industrial engineering, will be receiving the 2016 American Society for Engineering Management Best Dissertation Award for his dissertation Modeling New Product Success from Component Measures of Product Advantage: A Model Utilizing Automated Text Classification and Sentiment Analysis.

This award annually recognizes the Ph.D. dissertation that makes the most significant contribution to the engineering management field.

Akerman's work analyzed product reviews on Amazon for their ability to model product advantage. His analysis required innovative programming and model design to allow for the computer analysis of 2.6 million opinion phrases.

"Nolen built upon an idea we had discussed to improve the way we analyze text-based data," said Dr. Larry Mallak, Akerman's dissertation advisor. "This work has the potential to identify more effective ways for companies to achieve product advantage.

"Nolen has a unique sense of taking a problem and using a systems approach of problem definition, data analysis, and advanced computer programming to solve problems at different levels than conventional methods would dictate," Mallak said. "When we team-taught a systems course here at WMU, he would build Excel models to show the students how to easily solve typical problems. Then he would record a tutorial on how to build the model and load them on YouTube for use in the course."

The award will be presented to Akerman and Mallak at the group's international annual conference in October in Concord, NC.

Akerman currently works as a principal data scientist in the global analytics department at the Kellogg Co. headquarters in Battle Creek. In his current role, he provides analytic solutions and tools to help answer relevant business questions with data. Before joining Kellogg, Akerman worked for 10 years at Stryker in Kalamazoo in a variety of roles within the R & D and information technology departments. He received a B.S. in engineering management in 2001 and an M.S. in industrial engineering in 2004, both from WMU.

Brower receives scholarship from gear industry organization

Christian Brower

Christian Brower, a student in the accelerated master's program for mechanical engineering, recently received a $5,000 scholarship from the American Gear Manufacturing Association (AGMA) Foundation. The AGMA Foundation Scholarship Program is open to students interested in a career in the gear industry or in power transmission as it relates to the gear industry. Brower was working with the college's Center for Advanced Vehicle Design and Simulation (CAViDS) this past summer, where he was evaluating the accuracy of models used to predict coefficients of friction for gearbox applications.

"I am excited and grateful that the AGMA Foundation chose me for this scholarship," Brower said. "It will help me cover educational costs while allowing me to focus on my research goals."Christian Brower, a student in the accelerated master's program for mechanical engineering, recently received a $5,000 scholarship from the American Gear Manufacturing Association (AGMA) Foundation. The AGMA Foundation Scholarship Program is open to students interested in a career in the gear industry or in power transmission as it relates to the gear industry. Brower was working with the college's Center for Advanced Vehicle Design and Simulation (CAViDS) this past summer, where he was evaluating the accuracy of models used to predict coefficients of friction for gearbox applications.

Brower's graduate school scholarship is renewable for up to two more years for a total of $15,000. Founded by AGMA members in 1994, the AGMA Foundation supports and strengthens education, training and research for the gear industry.

"Christian has been doing an excellent job on the project and the CAViDS team is proud of this accomplishment," said Dr. Claudia Fajardo, associate professor of mechanical engineering and director of CAViDS. "The award validates the importance of involving undergraduate students in research, and the benefits of industry-university collaborations."

For more information about CAViDs, visit www.wmich.edu/vehicledesign.

Ari-Gur's NSF award to bring state-of-the art instrument to WMU

Dr. Pnina Ari-Gur, WMU professor of mechanical and aerospace engineering, was awarded a National Science Foundation (NSF) research grant of $452,399 to acquire an advanced X-ray diffraction system with unique capabilities. It will be able to reveal structures down to the nano-scale, determine thickness of nano-layers, and so much more -- and all that at temperatures ranging from -160 °C to +600 °C.

Dr. Pnina Ari-Gur

Thanks to this NSF Major Research Instrumentation grant, researchers and students at Western Michigan University will be able to employ a sophisticated scientific instrument that is unavailable anywhere in Michigan. Participating with Ari-Gur are Clement Burns, physics; Paul Fleming, chemical and paper engineering; John Patten, industrial and entrepreneurial engineering; and Massood Atashbar, electrical and computer engineering.

The award, "Acquisition of an X-Ray Diffraction System for Nanostructured and Advanced Materials Research and Research Education and Outreach," funds the purchase of a state-of-the-art X-ray diffraction (XRD) system that will support multidisciplinary research and education in institutions throughout West Michigan and beyond. This modern X-ray diffraction system enables cutting-edge research in nanotechnology, physics, materials science, chemistry, electrical engineering, and other areas.

The knowledge generated will be used to design new materials and processes, and "tailor" their structure and properties to meet specific demands, such as materials for green energy production, medical devices, sensors, flexible electronics, and more. The system will help educate future researchers by providing opportunities using modern research instrumentation. In addition, the university has strong outreach programs, including training and retaining science teachers, and providing opportunities for high school students. The instrument will greatly benefit these programs and attract students to STEM research as a career path. In addition to serving as a shared, multi-user, multi-purpose facility for WMU and other area institutions, it will also be used by local high-tech businesses.

"I am very excited about this award," Ari-Gur said. "It will open so many new opportunities. I can hardly wait to have the XRD system here and bring it to operation."

For information contact: pnina.ari-gur@wmich.edu

Alumni Spotlight: Josh Cook and Jon Good

Jon Good and Josh Cook from Green Door Distilling Co.

This issue we are featuring two alumni – both 2012 graduates of WMU's engineering management program. After several years working in industry, Josh Cook and Jon Good have taken their engineering know-how and put it to use starting Green Door Distilling Company in Kalamazoo. It is the first distillery opened in Kalamazoo since 1858 and focuses on whiskey, bourbon and other spirits. It opened Sept. 10. Josh can be reached at josh@gddistilling.com; Jon at jon@gddistilling.com.

What have your career paths been like since graduating from WMU's College of Engineering and Applied Sciences? Have there been any surprises along the way?

JOSH: What I really enjoyed about engineering management was that it allowed me to pick from many different career paths and industries. I was able to work on solar photovoltaic

engineering and design, while also pursing automotive interests as a project engineer at Summit Polymers. From there, I went into construction engineering, consulting at StructureTec, traveling the country for four years evaluating structures and managing the data management services division. The surprise for me was how many industries value an engineering management degree. It can be tailored to a lot of career paths and personal interests.

JON: Post-graduation I worked as an applications engineer for two years. It was enjoyable, but I quickly learned that not everyone is open to doing things more efficiently -- even to the extent of ignoring quantitative results and choosing to continue a process in the same manner. In project management, this is an immediate red flag and the majority of the time, an area for the company to improve and grow, both financially and efficiently. That some companies choose to operate without analysis and evaluation was the biggest surprise of my engineering career.

How has your engineering background helped you in starting up a distillery?

JOSH: It's helped every step of the way. From understanding and building financial forecasts, to production planning, to building and construction, engineering has played a large role. Engineering management also prepared me for speaking and communicating with all types of people, and without that, I wouldn't be where I am today.

JON: An engineering background has been invaluable in starting this business. The engineering management program at WMU is part of the industrial and manufacturing department and distilling itself is an industrial manufacturing process. I was able to take what I learned at WMU and apply it directly to production -- from designing the production facility, to equipment sizing, to using queueing theory to determine how much space is required for whiskey barrels.

Have there been any particular challenges along the way that required engineering know-how to resolve?

JOSH: Yes, of course. Starting a business is the largest engineering problem a person will ever have to solve. It involves everything from social engineering, to engineering planning, to engineering design, to construction engineering and so on. But that's part of the intrigue for me, that's what makes it fun. It's been a huge overall engineering challenge to design a production space that would be efficient, safe and free of possible vapor build-up. We also needed to be visible to the public and convince the city of Kalamazoo that we could do it.

JON: There have been several challenges in which an engineering background has helped us arrive at a solution – particularly, having the understanding of thermal dynamics and fluid mechanics. With any start-up manufacturing business, there are several weeks of equipment testing and tuning prior to full-scale production. In our case, testing and tuning included tank implosions, leaking cooling systems, and slow-running equipment. Having an understanding of what was actually happening within a piece of equipment was invaluable.

What brought you to WMU's College of Engineering and Applied Sciences?

JOSH: I chose WMU first because it was close to home. Second, because of its reputation as a nationally ranked engineering college. Last was probably because I was a B student in high school and I knew I could get in!

JON: Originally I studied architecture, however I found that it didn't possess the specificity that I wanted. At the time, a friend of mine was studying engineering at WMU so I decided to take a tour of the Parkview campus. As soon as I walked in, I knew I wanted to enroll. Everything was state-of-the-art, from the building itself to the classroom technology.

Describe your favorite Bronco moment.

JOSH: My favorite moments are "bookend" events. First was Fall Welcome and the joy of realizing I was free and responsible for everything that happened from then on. I also have a memory of learning how to juggle at Miller Auditorium, and that was also a life goal! I can still juggle to this day. The second is graduation day. All the work, the projects, the interviewing, all came to a head on graduation day. It was a huge milestone for me personally, and I was looking forward to a two-week vacation afterward with a fellow Bronco.

JON: My favorite Bronco moments were the times before presentations. The moments when you've reviewed and rehearsed as much as you can and all you have to do is give the presentation.

The Green Door Distilling Company is located at 429 E. North Street in Kalamazoo across from Louie's Trophy House.

State of the college presented at September meeting

Great things are happening in the College of Engineering and Applied Sciences and Dean Houssam Toutanji highlighted some of those at the first "All Hands" Meeting of the academic year. Faculty and staff received an update on the state of the college, including the college's mission and vision, an overview of enrollment trends, research efforts and faculty, staff and student accomplishments.

Toutanji said the college leads WMU in graduate student enrollment increase this fall and has the highest number of honors students on campus. "We are working together, accomplishing a lot, and have a lot to be proud of," he said.

Among the highlights:

- Overall enrollment in the college is at 2,992 – up 2.12 percent over fall 2015. While undergraduate enrollment is down 2.63 percent from last fall, master's degree enrollment is up 16.34 percent with 477 students. Most noticeably, the doctoral program has grown 66.29 percent and now has 148 students.
- During the 2015-16 academic year, 332 undergraduates were awarded degrees. In addition, 169 master's degree students and 18 doctoral students received degrees.
- Research grants for the fiscal year 2015-16 totaled almost $3.65 million, with $2.1 million coming from federal funding.
- The college recently received a significant gift that will be used to establish the Georgeau Institute for Construction Research.

Toutanji also noted that the college is expanding its offerings. A certificate in paper engineering now is available, and a certificate in cybersecurity is expected to be rolled out in fall 2017. Other new programs include a master's degree in medical engineering for fall 2017 and a bachelor's degree in biomedical engineering slated for fall 2018. A certificate in systems engineering also is being evaluated.

Research directions for the college include supporting three of the National Academy of Engineering Grand Challenges, specifically, engineer the tools of scientific discovery, secure cyberspace, and restore and improve urban infrastructure. Other focus areas of research for the college include engineering education, medical engineering, systems engineering, clean and renewable energy, and disciplinary research.

He said faculty and staff have been busy preparing for ABET accreditation in 2017-2018 with a mock visit scheduled for Oct. 21-Nov. 1, 2016.

Other recent activities and initiatives include the completion of a unisex bathroom in Floyd Hall, renovation of an engineering annex at the Kalamazoo-Battle Creek International Airport for use by registered student organizations (RSOs), and the hiring of several new faculty and staff.

New Faculty

- Dr. Kecheng Li, department chair, chemical and paper engineering
- Dr. Seung-Hee Bae, assistant professor, computer science
- Dr. Decker Hains, master faculty specialist, civil and construction engineering
- Dana Hammond, faculty specialist, industrial and entrepreneurial engineering and engineering management
- Michael Konkel, faculty specialist, engineering design, manufacturing and management systems
- Timothy Chapman, faculty specialist, industrial and entrepreneurial engineering and engineering management

New Staff

- Dr. Michelle Wright, research program officer
- Kyle Manninen, recruiting and outreach specialist, chemical and paper engineering
- Jamie Long, administrative assistant, chemical and paper engineering
- Amanda Hoger, administrative assistant, electrical and computer engineering

New Roles

- Dr. Andy Kline, associate dean for research and graduate education
- Dr. Koorosh Naghshineh, interim chair, mechanical and aerospace engineering
- Matthew Stoops, faculty specialist, chemical and paper engineering