College of Engineering
UNIVERSITY OF WISCONSIN–MADISON

FALL 2024 NEWSLETTER

DEPARTMENT OF

CHEMICAL AND BIOLOGICAL ENGINEERING

In July 2024, Brian Pfleger, the Karen and William Monfre Professor, took over the title of R. Byron Bird Department Chair from Howard Curler Distinguished Professor Eric Shusta, who is stepping down after a successful three-year term.

During Shusta's tenure, the department saw graduate enrollment climb, a major reimagining of the John C. Kuetemeyer Instructional Laboratories, the development of the state-of-the-art Bluemke Family Biotechnology Lab, and the addition of several exciting new faculty. Pfleger says he's eager to keep CBE moving forward, sharing his goals for the next few years.

What's the state of the department as you take over? Eric Shusta has been a very effective chair. Given the number of faculty he hired, the administrative and financial structures that he put in place, we're in a better situation today than we were when he started. That's been true of the last few chairs and we're now seeing measurables from all of their combined work. So, if you ask me what my primary job is, No. 1 is to not lose that momentum, and then No. 2 is keep it accelerating.

What are your priorities as chair? First, I want to hire more faculty to get us closer to our target of 25. New faculty bring new perspectives, new research skills, and new opportunities for students. We have authorization to look for five new faculty this year and have begun work to recruit them. We also have to develop and retain the talent that we've brought in recently. We want to make sure UW-Madison remains a place for them to take the next step in their careers so they can be lifelong Badgers.

Second, I want to reinforce the vibrant community that is CBE. We want to examine our educational programs to ensure they remain among the best in the world. We want to revisit our graduate student support models so we can continue to attract the best and brightest students to become Badger engineers.

Are you working on any new facilities? Yes, facility improvement is a constant. With new faculty come new research infrastructure needs. The same is true for instructional changes and our desire to maintain high-quality work and learning environments. All of these projects depend on the generosity of alumni and this year we'll be using gifts to help improve spaces for the graduate student experience. We will also be working to integrate CBE elements into our new engineering building, the Phillip A. Levy Engineering Center, that's coming soon.

What do you think is the department's strongest asset? The strength of this department has always been its people, and we're blessed to have absolute excellence top to bottom. Our faculty and our staff are incredibly supportive and hardworking. Our students are demanding and bring lots of energy to our classrooms and laboratories. You know, Wisconsin is a very special place, and we want to make sure that we give our students the education they deserve.

On, Wisconsin!

Graduate students gather

In August, the department welcomed its new (and largest) incoming graduate class in recent history, with 37 students! Many of the students credit the climate and the welcoming nature of the department in choosing UW-Madison.

"I observed an amazing cultural environment within the department. Not just between faculty, but between the graduate students, and graduate students and faculty," said one student in a comment after their visit.

"The visit weekend is a big reason I decided to attend! All of the graduate students and faculty were very welcoming, and it was clear that the department had a great environment," said another.

At the semester's start, we rolled out the welcome mat again—and the dough—with an annual cookie competition. While the cookies were sweet, the competition was fierce. Three cookies took the cake: ube cookies from Joshua Abraham; a cat-astic cookie from Jung Ming Lee, and a delectable peanut butter cookie from incoming student Joshua Eckert.

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On the cover: Professor Emerita Regina Murphy adds the first charge to the distillation column in the new John C. Kuetemeyer Instructional Laboratories. Photo: Todd Brown.

Photos: Todd Brown.

In April 2024, after a decade of planning, fund-raising and more than a year and a half of construction to transform our summer lab space into a modern laboratory, the John C. Kuetemeyer Instructional Laboratories officially opened. College of Engineering Dean Ian Robertson spoke at the event. "Our college can boast of a long and proud legacy of leadership in chemical engineering research and education. But today—thanks to the unwavering vision, determination and financial support of many people—that legacy will live on in a space that is not only aesthetically stunning, open and welcoming … but importantly, also provides the modern resources our students need today and the flexibility to evolve and adapt in the future," he said.

Before construction, the lab hadn't changed much in the past 50 years. But in May 2019, a vision was born to upgrade and expand the instructional lab space. Throughout 2019 and 2020, CBE raised funds for the project. Then, in fall 2021, the plans were finalized and approved with a brick-breaking ceremony that kicked off construction in October 2022.

"I can vouch that back in the 1990's when I was a student, things were very similar to when this project started in the fall of 2022," says past chair Eric Shusta. "In fact, I had no idea that there were windows in that laboratory! Now, as you look at these spaces, you have ample natural light in each lab, and the large glass walls allow everyone to see what exciting work chemical and biological engineers are up to."

Alumni, donors, faculty and staff were in attendance to celebrate the completion of the lab and see the result of their support. All attendees were invited to pour some of their "Badger blood, sweat and tears," a mixture of water and red food coloring, into a flask which then went into the distillation column as the initial charge. Professor Emerita Regina Murphy, who as department chair and after her retirement was a major driver in getting the project off the ground, had the honor of adding the first charge and officially opening the lab.

Faculty and staff in CBE are excited about the expanded opportunities the new lab will provide students. Even during its construction, the lab provided unique learning experiences for students. As it was going through its final preparations, some students could access the new space, and a handful of students worked on drafting a new fermentation course manual for the upcoming summer lab. Others worked with Faculty Associate Eric Codner on constructing the equipment. A few additional classes were also held in the new space.

But the most important test came in summer 2024 when the latest cohort of graduating CBE students took part in the first two summer lab sessions in the space, which, by all accounts, were very successful.

We are thrilled with the new instructional labs and excited students had their first summer lab experience this year. Thank you to all who were involved in this project, big or small. We are very grateful to our community who came together to bring this vision to life.

Scan to see a video of the grand opening celebration.

Whitney Loo explains plastics recycling and the challenges of sustainability

Conway Assistant Professor Whitney Loo studies polymers, which are "macromolecules" composed of many repeating units. They are the building blocks for many plastics. Polymers can be difficult to break down for reuse because they're so large and sometimes complex. Loo's research group is looking at new ways to design and reuse polymers for a sustainable future. We asked her about her work.

What is it about polymers like plastics that makes them so challenging to use sustainably? Polymers are large molecules made up of many subunits, or monomers. Typically, a lot of these monomers are derived from petrochemical precursors. So even from the beginning, they're not necessarily a very sustainable option because they're starting as petroleum byproducts.

The other reason is what happens at the end of their product life. Because polymers are very long molecules, they don't like to mix. So what happens in some recycling centers, by hand or by machine, is that all of those different plastics you throw in the recycling bin have to be sorted before they can be recycled. That makes plastic recycling really expensive. Making these same materials from virgin products is, by contrast, extremely inexpensive. So it can be easier to just throw plastics away and make new ones rather than recycle old plastics into new products.

Instead of petrochemicals, can we make plastics from more sustainable source materials? There's a lot of ongoing research in developing new precursors to build plastics that come from non-petrochemical sources. Some of that is looking at using lignin, which is a byproduct from trees and is a waste product from the paper industry.

There has also been research on using microbes to more sustainably generate new monomers from different sugars, bacteria and yeasts. There's a lot of work happening in the sustainable catalysis world of taking abundant materials and using catalysis to transform those materials into monomers without using petrochemical-derived feedstocks. These developments are at different phases, and we're at the point where we're starting to see some scale-up pilot-plant industrial-scale testing for some of these options.

What are some other avenues you see to reduce the environmental impact of plastics? My group has some projects on mechanical recycling, where we are developing "compatibilizers" that will hopefully enable recycling of mixed-waste plastic streams without that presorting process. We're targeting plastic materials with very high mechanical integrity and a very long shelf life. We're trying to translate single-use plastics—like Styrofoam coffee cups or water bottles, which are brittle, bendy materials—into really resilient materials that could, for example, be used in a park bench.

Your research also touches on energy storage. How do polymers play into that? Our energy-storage work focuses on polymer electrolytes for lithium-metal batteries. Lithium-ion batteries are what we use pretty widely today, and those use a graphite anode or an electrode, where there's about one lithium atom for every six carbon atoms. So if you need a certain amount of lithium, you're going to have to increase the size of everything else. With lithium-metal batteries, we can take out all of the supporting graphite matrix and move to using pure lithium. That greatly increases the energy storage.

Turning corn syrup into valuable pharmaceuticals

Professors George Huber, Jim Dumesic and graduate researchers Hochan Chang, Elise Gilcher and Min Soo Kim have found that corn syrup might have a higher purpose than sweetening food. They have developed a process that can transform high-fructose corn syrup into a valuable pharmaceutical, showing it might be possible to repurpose the high-fructose corn syrup infrastructure for sustainable chemical production.

"We show how you could use corn syrup as a key feedstock and how that could be integrated into the high-fructose corn syrup industry," says Huber.

Currently, many industrial chemicals are derived from petroleum products or from scarce natural resources. That's why researchers are looking to biomass as alternative feedstocks for chemical production. By breaking down cellulose, a fibrous substance found in the cell walls of plants via a process called acid-catalyzed hydrolysis, it's possible to convert the biomass into precursor or platform chemicals. Using various processes, it's then possible to upgrade these precursors into more high-value chemicals.

In this project, the team was able to leverage its understanding of catalytic reactions to design a greener and more economical process to convert high fructose corn syrup into rehmanone A, a pharmaceutical ingredient.

Chang says the process could be targeted to produce many other chemicals, some of which are previously undiscovered compounds with potential pharmaceutical applications. But to be economically viable the process relies on keeping things local. "For example, in Wisconsin there's a lot of corn, so this process can start from glucose or high-fructose corn syrup," says Chang. "So companies can diversify into not only selling food additives but platform chemicals as well."

New center to harness energy, nutrients from biomass


George Huber

The nonprofit Schmidt Sciences and the Foundation for Food & Agriculture Research have selected a multi-institution group of researchers to establish the new Center for Mineral and Metal Oxide Removal from Biomass (CMORE) at UW-Madison.

The center is part of the new Virtual Institute on Feedstocks of the Future (VIFF), an initiative with a mission to support U.S.-based science and technology focused on leveraging underused biomass carbon sources as future feedstocks for biomanufacturing

CMORE's main goal is to find ways to remove minerals and metal oxides from biomass before they undergo catalytic conversion. "We are looking at many different removal technologies. We want to extract minerals from the biomass and return them to the soil," says CMORE executive director and Richard L. Antoine Professor George Huber. "Then we can make mineral and metal oxide-free biomass pellets, which can be used to produce fuels and chemicals through different downstream catalytic technologies."

Duane H. and Dorothy M. Bluemke Assistant Professor Styliani Avraamidou will co-direct the center. Hunt-Hougen Associate Professor Reid Van Lehn, Baldovin-DaPra Professor Victor Zavala and Professor Emeritus James Dumesic are also part of the new center.

Replacing fossil feedstocks with renewable biomass sources will be a key element of a successful circular bioeconomy, with the potential to increase the environmental sustainability of manufacturing, provide new revenue sources for farmers, ranchers and municipalities, and support manufacturing supply-chain resilience.

Biomass, including materials like agriculture waste, woody waste material and some solid municipal waste, is a promising, latent low-carbon energy source. It is possible to isolate the cellulose naturally found in these materials and then catalytically upgrade it into valuable low-carbon fuels, chemicals and materials displacing petroleum products. The problem is that these materials contain alkali and alkaline earth metals that can foul catalysts and reduce their lifecycles.

CMORE will explore several technologies for reducing these minerals, including expanding a process called MinFree, developed by Huber's lab and commercialized by spinoff company and industry partner Anellotech. The team will also research solid municipal waste as a potential biomass feedstock and explore ways to return the alkali and alkaline earth metals to the soil as fertilizers.

Ultimately, the team hopes these techniques could make processing biomass at a regional or local scale feasible. "We want to figure out how to make these high-quality, mineral-free pellets that can be the basis for fuels and chemicals," says Huber. "And ideally, we want to do this where the biomass is: at local depots where we can return the nutrients to the soil."

Machine learning illuminates experimental design for synthetic biology

When Zack Harmer's advisor and lab leader, Biomedical Engineering Associate Professor Megan McClean, suggested he explore a potential collaboration with CBE Professor Victor Zavala's computational group, the PhD student didn't need to look far.

David Cole, Harmer's roommate for three years, was a PhD student in Zavala's lab, which has a litany of experience applying computational techniques to engineering challenges.

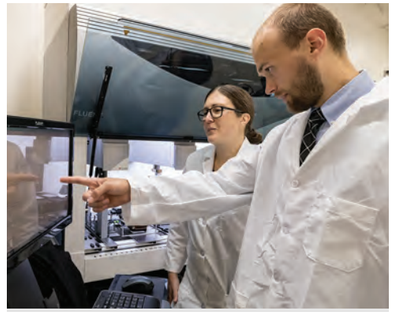
That led to a collaboration in which the teams created a framework for designing advanced synthetic biology systems that could be useful for generating biotherapeutics or other bioproducts.

In optogenetic systems, scientists manipulate biological processes through light-responsive proteins. Many of those proteins respond to blue light, which presents a challenge when trying to design more complex systems that allow for independent control over multiple processes. One potential solution is to take advantage of different dynamics of blue light; for example, pulsed light might activate one such function, while sustained light turns on another.

The team was able to harvest a trove of data generated by Lustro, a system previously developed by Harmer and McClean for high-throughput testing, to accelerate the design and optimization of optogenetic systems.

"All of a sudden you have access to all of this data, to test all of these different conditions, and we were able to apply more sophisticated techniques than what I originally envisioned," says Zavala. "We were able to use machine learning approaches to construct this model directly from data, trying to find optimal conditions and trying to recommend experiments in a closed-loop manner. That was transformational."

Zavala's group developed neural networks that, given a range of experimental conditions could predict outcomes while also quantifying the level of uncertainty in those predictions. Jaron Thompson, a PhD student co-advised by Zavala, primarily developed the machine learning tools.



BME Associate Professor Megan McClean and PhD student Zack Harmer collaborated with CBE Professor Victor Zavala to develop a technique to optimize optogenetic systems. Photo: Tom Ziemer.

McClean and Zavala are already exploring additional opportunities to apply similar approaches to more complex biological systems, as well as developing and leveraging more sophisticated modeling techniques.

Graduate student Arthur Lin explains the "spherical cow"

Arthur Lin, a graduate student working with Conway Assistant Professor Rose Cersonsky, presented his research at Wisconsin's Falling Walls Lab, a competition where young innovators showcase breakthroughs that have a positive impact on science and society.

Tell us more about your presentation topic, "Breaking the wall of the spherical cow." It alludes to the "spherical cow" metaphor used in physics, which basically states that while you can obtain some physical insights about a cow's behavior/properties by approximating a cow to be a sphere, such an approximation loses grounding in physical reality. My spherical cow is the fact that we often don't explicitly incorporate molecular geometry into molecular simulations. Within simulations, we often treat molecules as spheres or spheres strung together. Such approximations have been useful but also limited due to these oversimplified geometry assumptions. My work focuses on incorporating molecular geometry into molecular simulations, and using machine learning techniques to gain insights on how complicated molecular geometries influence the behaviors of molecules that we observe.

How did your chemical engineering studies help prepare you for your presentation? The engineering curriculum definitely places emphasis on communication and presentation, as many end-of-the-semester engineering classes contain presentations. My favorite presentations were in Professor Victor Zavala's statistics class, where we had to present our projects within five minutes. This competition was very reminiscent of these projects, though these presentations were even snappier.

What drew you to the Cersonsky research group? Assistant Professor Cersonsky is an *excellent* communicator and mentor, which were my top criteria when choosing a professor. I was always interested in the intersection of machine learning and physical sciences, and her strong background in developing powerful machine learning techniques that explicitly incorporate physics was a huge draw. Our lab is quite math-heavy, so to see her being able to communicate these complex topics without getting lost in the math is something I admire and try to emulate, and I've been taking as many opportunities as I can to present my work, including via this competition!

From left to right: chemical and biological engineering students Aidan Bomski, Lauren Carlisle, Ethan Saye, Josh Abraham (PhD student) and Harith Razif. Photo: Claire Massey.

Fermentation lab brings new teaching focus to CBE

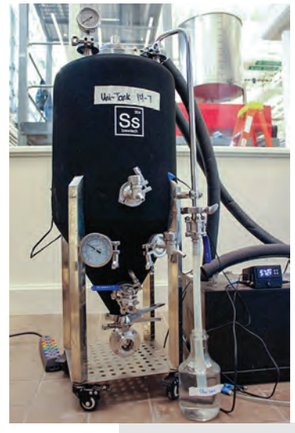
In spring 2024, a group of students worked with Karen and William Monfre Professor and Vilas Distinguished Achievement Professor Brian Pfleger to set up the department's first fermentation lab. Seniors Aidan Bomski, Lauren Carlisle, Ethan Saye and Harith Razif, along with PhD student Josh Abraham, all helped put the lab together and create a set of experiments that will be incorporated into a manual for future courses.

The equipment was donated by Tom Nieman (BSChE '81), owner of Foxtown Brewing in Mequon, Wisconsin. When his operation expanded, he knew exactly where to donate the equipment that he had outgrown. He sent it to his alma mater, which has incorporated it into the new John C. Kuetemeyer Instructional Laboratories in the basement of Engineering Hall.

By taking an independent studies course, the students got hands-on experience toward their degree. Even more, a major focus of the students' work was designing the experiments for future courses. As students themselves, they provided perspective on what skills were the most important for them to learn and which experiments they thought students will enjoy most. At the end of the semester, their work culminated in a manual that guides the fermentation course as part of summer lab.

As the students worked on designing experiments for the manual, they reflected on foundational principles. They also used a backwards teaching process, which starts with the learning outcome and works back to determine how students will measure the outcome of the experiment.

To develop their experiments, the students designed recipes and brewed beer, an ideal application of fermentation. A big part of the work involved determining the layout of the lab and optimizing each step in the brewing process. As the students brewed the first batches, they evaluated how to best use the space. They also troubleshot future experiments to help ensure the lab course runs efficiently.



Above: Beer ferments in brewing tank. *Below:* Different grains in the beer result in different flavor profiles. Photos: Claire Massey.

Pfleger looks forward to the impact the lab will have on students' education. "In a fermentation lab, you really have all the fundamental elements from every class we teach: material balances, heat exchange, energy efficiency, kinetics, control and even thermodynamics," he says.

Carlisle agrees. "It really challenges us to come up with experiments and be creative. It's very different compared to other labs and classes that already have experiments set up and laid out for you," she says.

Abraham is glad he could help set up the new capabilities. "I love how much hands-on experience there is here at UW-Madison. Coming down to the fermentation lab will be a great experience for students and also help them understand what they're looking for in a career and what they're passionate about," he says. "It shows exactly how these theoretical ideas and philosophies from class have real-life impacts, especially in something more common and approachable like brewing."

Chef overcomes obstacle in quest to earn chemical engineering degree

Puls poses next to the chemical vapor deposition system in CBE Assistant Professor Matt Gebbie's lab. At his new job at Taiwan Semiconductor Manufacturing Company in Phoenix, Puls will work with industrial versions of the machine. Photo: Joel Hallberg.

In 2018, Theodore Puls was living in Boulder, Colorado, working as the chef at a restaurant he helped design when he hit a rough patch. He was in the middle of a breakup with his partner. Then, he accidentally sliced the tendons in his middle finger, requiring surgery. During his long, painful recovery, he began thinking about his future. He decided to give up cooking and return home to Wisconsin. "I wanted to have more in my life," he says. "I wanted to build a bigger, better future."

After overcoming more than a few struggles, Puls graduated with a degree in chemical engineering in May 2024. He also recently started a job with Taiwan Semiconductor Manufacturing Company (TSMC), the world's largest computer chip maker, at its new plant in Arizona.

Puls grew up in Milwaukee, the second-oldest of six children. After graduating from high school in 2010, he attended culinary school, then worked for eight years as a chef in Milwaukee, Chicago, Denver and Boulder

While he enjoyed the kitchen, he began to realize that the career was physically demanding and the future was always tenuous. So when his knife accident happened, it felt like a sign to switch tracks.

"It was not an easy time in my life. And I remember telling myself, I need to choose a path and stick to it the same way I chose to be a chef and stuck to it," he says. "I thought about my skill set and thought chemistry would be a good route, but I also liked working with equipment, heating stuff up, and mixing stuff together. I found chemical engineering was the perfect intersection of my interests."

Puls began taking courses at Front Range Community College before being accepted as a transfer student at UW-Madison in 2020.

One of the first courses Puls attended in person was an engineering thermodynamics class taught by Conway Assistant Professor Matt Gebbie. Puls says he struggled in the class because it challenged him to think in ways he hadn't before. But the difficulty pushed him to focus even more. "I started believing in myself—that I could actually be among these top-performing students I was in class with. I guess I always had a little bit of an inferiority complex."

As he found his academic groove, however, a personal tragedy struck. During the fall semester of his junior year, Puls' younger brother passed away from an overdose. While Puls was tempted to withdraw for the semester, he decided to continue on.

That was only possible, he says, because of the support of his instructors, including Associate Professor Ross Swaney and Assistant Faculty Associate Katelyn Dahlke, as well as his engineering academic advisor Catherine Turng and mental health professional Chris Haas at University Health Services.

"I wouldn't have been able to do any of this or get through any of this my junior year without these people," says Puls.

Soon after, he began as an undergraduate researcher in Gebbie's lab, where he found his academic "family." At the spring 2024 engineering career fair, he submitted a resume to TSMC and was surprised to get a request for an interview. That turned into a job offer, and in July 2024, he began as a chemical vapor deposition process engineer at the company's plant in Phoenix—drawing directly on skills he developed in Gebbie's lab.

"Thinking back, five years ago I was washing dishes in the restaurant I managed," Puls says. "There are so many places in my academic career where I could have given up: But instead, I chose to focus on the positives, the things that keep me strong. I couldn't have imagined this outcome, but I am so proud of where I've come from and where I'm going."

Checking in with recent alum Teja Balasubramian

Last summer, Teja Balasubramanian (BSChE '23) took some time to meet with graduating seniors taking summer lab. In addition to answering their questions about entering the working world, Teja shared some additional insights with us.

What can you share about your career path? I am currently work for a biotech company called Illumina. During my junior year, I was lucky enough to be hired for a manufacturing operations internship at Illumina's Madison site, where they produce the enzymes required for DNA sequencing through fermentation. After my internship, I was hired as a contractor with the company part-time during my senior year. I was hired back full-time and began working there directly after finishing summer lab.

What are your career highlights so far? It was exciting to see my internship project designing a solids conveyance system come to fruition. As an intern, I worked on creating user requirements and functional specifications, and scoping out vendors for this system. When I became a contractor, I interacted with the vendors to identify the most appropriate solids conveyance technology for our applications. After that, it was time to design the skid, which was the most exciting part. The machine was ordered and shipped from France. The full process took a little less than a year to complete, and it's been my favorite project so far.

How did CBE prepare you for your next steps? The challenging coursework and high academic standards in CBE helped me to develop a strong technical foundation and problem-solving skills that I use at my current position. Working with fellow students through my various jobs during the school year helped me to develop soft skills like communication. Balancing job responsibilities with academic expectation helped me with time management which has translated to improved project management. Developing reports and presentations during summer lab and other courses improved those skills for me so I can excel at those tasks, which I carry out regularly at my job.

2024 Engineers' Day honorees

2024 EARLY CAREER AWARD
Christine Erspamer
BSChE '07
Chief of growth, product and strategy, Optum Serve, part of UnitedHealth Group

Since graduating from UW-Madison, Appleton, Wisconsin, native Christine Erspamer has worked in the healthcare sector, delivering solutions to make healthcare systems easier to navigate and more affordable for patients.

Erspamer started her career with Accenture, a global management consulting company, hoping to focus her analytical and problem-solving skills on the incredibly complex world of healthcare. After moving to UnitedHealth Group, based in greater Minneapolis, Erspamer started by working in Optum Advisory Services and now works for the company's Optum Serve business, which focuses on delivering healthcare solutions, capabilities and strategies for federal agencies, including the Department of Veterans Affairs, the Defense Health Agency and others. Over the last decade, Erspamer has held several roles in the company, including VP for program delivery and COO of Optum Serve Health Services.

"I found that I love being able to take the concepts of engineering—data analytics, understanding variables, and breaking down a complex problem—and use them in the business world," she says. "There's such an opportunity to bring engineering concepts into the way we think about, deliver and manage healthcare."

2024 DISTINGUISHED ACHIEVEMENT AWARD
John Church
BSChE '88
Chief transformation and enterprise services officer (retired), General Mills

John Church spent more than 33 years working for the food company General Mills as a leader in operations, sourcing, business integration, supply chain logistics and change implementation.

After graduation, he hired on with Minneapolis-based General Mills, where he spent his entire career until retiring in 2022. He began in the product development and R&D branch of the company, leading the development of Multigrain Cheerios and the construction of a state-of-the-art plant that makes the cereal. That led to a decade of overseeing plant operations in factories across the United States before he spearheaded the integration of the Pillsbury Company into General Mills.

In 2003, he became vice president in charge of global sourcing and later chief supply chain officer, leading 22,000 employees at 56 plants producing $11 billion worth of product. During his tenure, he set new records for productivity, improved worker safety, and navigated COVID-related supply disruptions, while also championing net-zero emissions, developing opportunities for Hispanic leaders and improving the company culture. Church capped his career by leading a company-wide restructuring and technology-integration effort that improved the company's agility and decision-making speed and saved $200 million per year in the process.

Faculty news

Whitney Loo received the Ralph E. Powe Junior Faculty Award from the nonprofit group Oak Ridge Associated Universities.

Hunt-Hougen Associate Professor Reid Van Lehn received the Benjamin Smith Reynolds Award for Excellence in Teaching from the College of Engineering.

Baldovin-DaPra Professor Victor Zavala received the Harvey Spangler Award for Innovative Teaching and Learning Practices from the College of Engineering.

Thatcher Root was named the Kreuz-Bascom Professor in chemical and biological engineering. Root studies catalysis and reaction chemistry related to biomass conversion and has been a long-time director of the CBE summer lab program.

Student news

Two CBE students received sophomore research fellowships for the 2024-2025 academic year. The award provides students $2,500 and $500 to the faculty project advisor to work in collaboration on research projects. Alexandra (Allie) Ma received the award with project manager Yoel René Cortés-Peña; both work with Baldovin-DaPra Professor Victor Zavala in his lab. Caleb Youngwerth received the award with Conway Assistant Professor Rose Cersonsky.

Two students received 2024-2025 Wisconsin Hilldale Undergraduate/Faculty Research Fellowships. The awards provide $3,000 to the student recipient and $1,000 to the faculty project advisor to offset costs of research. Undergraduate Kyuhyeok (Brian) Choi received the fellowship with Richard L. Antoine Professor George Huber. Sirinada Chanthachaiwat received the fellowship with Duane and Dorothy Bluemke Assistant Professor Siddarth Krishna.

PhD student Seth Anderson, who studies electrochemistry in the lab of Assistant Professor Matt Gebbie, received a DOE Graduate Student Research Program award.

Alumni news

Two CBE alumni were elected to the National Academy of Engineering, which honors outstanding contributions to engineering research, practice or education.

Leo H. Chiang (BSChE ’97) was cited for contributions to process data analytics and its applications to process monitoring and for continuous improvement in the chemical industry.

Chiang has spent his career at Dow, most recently as a senior R&D fellow, where he leads chemometrics and big data analytics implementations for manufacturing.

James Edward Rekoske (BSChE ’88; MSChE ’91) was cited for leadership in development and implementation of petrochemicals, renewable fuel, alternative energy and water conservation technologies.

Rekoske is currently senior vice president, global RD&E industrial, for Ecolab, based in Glenview, Illinois. He is responsible for the development and deployment of innovative and sustainable technology solutions across food and beverage, water, paper, mining and textile care.

Roger Harrison Jr. (MSChE ’69; PhD ChE ’75), a professor at The University of Oklahoma, has been named a David Ross Boyd Professor, one of the university’s highest honors.

Michael Graham receives top award in rheology

Michael Graham, the Steenbock Professor and Harvey D. Spangler Professor, received the 2024 Eugene C. Bingham Medal, the highest honor from the Society of Rheology. The medal is awarded annually to an individual who has made outstanding contributions to the field.

Graham was honored for foundational and pioneering theoretical contributions to rheology, including advances in understanding the structure and dynamics of confined flowing polymer solutions, instabilities in viscoelastic flows, turbulent drag reduction, collective dynamics in active suspensions, and blood flow in microcirculation underlying health and disease.

The Bingham Medal was established in 1948 in honor of Eugene C. Bingham, an early pioneer in the field of rheology, a term he coined. Graham received the medal and delivered a lecture at the annual meeting of the Society of Rheology in Austin, Texas, in October 2024.

Photos: Todd Brown.

Help grow our department

Over the last two years, our department welcomed five new faculty: Mai Ngo, Quentin Dudley, Rose Cersonsky, Whitney Loo and Siddarth Krishna. In 2019-2021, three faculty joined our family: Marcel Schreier, Matt Gebbie and Styliani Avraamidou. And more are on the way!

This September, we announced the search for five new faculty members as a part of the Wisconsin Research, Innovation and Scholarly Excellence (RISE) Initiative. With this strategic faculty hiring, we aim to address significant, complex challenges of particular importance to Wisconsin and the world. We hope this will strengthen our ability to address challenges and opportunities related to the environment and expand UW-Madison’s existing expertise in artificial intelligence and machine learning.

With the influx of new faculty, we’ve noticed a huge growth in our graduate classes. This fall we had our largest incoming graduate class in recent history of 37 students. Our department is rapidly expanding and as we anticipate new faculty joining our team, we foresee a continued rise in our incoming graduate classes.

With this kind of growth, we anticipate the need for more funds to support our graduate students as they pursue their degrees. In addition to graduate support, there is still a strong need to continue updating our laboratory space for prospective new faculty. Recruiting faculty is a tremendous task and modern and cutting-edge lab space is an important part of incentivizing talent to our department.

Your continued support goes a long way and makes a lasting impact for our department. If you are interested in supporting any of these efforts, please contact Mike Holland at mike.holland@supportuw.org; (608) 440-1178.

A huge thanks again to all of our donors who supported the new John C. Kuetemeyer Instructional Laboratories. Without the immeasurable support of everyone involved, we would not be where we are today. Students had a blast using the new space, setting up a fermentation lab and conducting experiments throughout summer lab!

In spring 2024, UW-Madison launched the Wisconsin Research, Innovation and Scholarly Excellence (RISE) Initiative, a multifaceted effort focused on faculty hiring, research infrastructure, interdisciplinary collaboration and student opportunity. The initiative addresses significant, complex challenges of particular importance to Wisconsin and the world.

CBE will take part in the RISE-AI, RISE-EARTH (environment: adaptation, resilience, technology and humanity), and RISE-THRIVE (Transforming Healthspan through Research, InnoVation, and Education) initiatives which will ensure dedicated focus and funding for the infrastructure and support necessary to make transformative discoveries and translate them into real-world impact.

As part of these initiatives, CBE has authorization to hire five new faculty members, at any stage of their career. In particular the department is looking for researchers interested in using artificial intelligence to solve CBE problems, those interested in applying all aspects of CBE toward developing sustainable chemical production technologies, and those who will work to advance our understanding of the human immune system through technological advancements.

Apply here:

Department of Chemical and Biological Engineering
UNIVERSITY OF WISCONSIN–MADISON

1415 Engineering Dr., Room 2018, Madison, WI 53706
engineering.wisc.edu/cbe

$75 million gift for new engineering building honors a brother's legacy and looks to the future

With a historic $75 million gift—the largest single gift in college history—brothers and UW-Madison alumni Marvin and Jeffrey Levy are honoring the memory of their brother, Phil, who passed away in 2021. A passionate and accomplished professional interior designer, Phil earned an English degree from the university in 1964.

The gift will fuel construction of the much-needed Phillip A. Levy Engineering Center, which will be the new centerpiece of the College of Engineering campus. A stunning facility that marries intentional design with future-ready engineering flexibility, it will spark collaboration and yield breakthroughs that echo across generations. With final approval by Wisconsin Gov. Tony Evers on March 6, 2024, it underscores the importance of outstanding engineers to Wisconsin's economy.

Marv and Jeff formally announced their support for the new building at an event at Bascom Hall on the UW-Madison campus in September 2024. "Through this gift, we can ensure the College of Engineering will remain on the leading

edge and educate an ever-expanding number of talented engineers for generations to come," said Marv. "Our family deeply appreciates the vital role engineering plays in driving innovations that advance our society and contribute to people's quality and enjoyment of life. Jeff and I view support of this new engineering building as a gift to the state of Wisconsin."