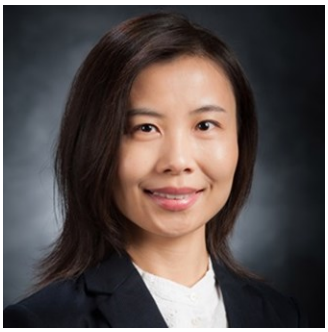
SEMESTER NEWSLETTER

Dr. Wu Promoted to Associate Professor with Tenure

Sarah Wu joined the University in 2016 and was granted promotion with tenure this year. Dr. Wu has training in Environmental and Biological Engineering with research experience covering a wide range of topics in advanced technologies to treat water, wastewaters, and waste and biomass materials for disinfection, emerging contaminant remediation, production of value-added biofuel and chemicals, and nutrient management. Sarah's current research interests include design, evaluation, development, improvement and application of physical, chemical, and biological processes for environmental remediation, green chemistry, renewable energy, nutrient recovery, and food processing with strength in various nonthermal plasma, electrochemical, and biochemical processes.



Some of the significant achievement while at the University are:

- Secured significant external research funding (approx. $2.3 M) from a broad range of highly competitive national programs including USDA-NIFA, DOD, and USGS.
- Established an outstanding research program in plasma technology and biological processes for wastewater treatment and renewable energy generation.
- Published 26 refereed journal an Assistant Professor at U of I with a career total of 58. Outstanding in both the number of publications and the quality of journals.

Congratulations, Dr. Wu !

Dr. Bernards Receives Presidential MidCareer Award

The Presidential Mid-Career award goes to gifted faculty during the middle of their career who have demonstrated a commitment to outstanding scholarship, teaching, and engagement.

Dr. Matthew Bernards has published 69 refereed/ adjudicated papers and 10 peer reviewed conference proceedings, averaging 8 publications per year over the past three years. He has secured more than $820k as the lead PI and collaborated on additional multi-university research efforts with research funding levels exceeding $7.6 million. This funding has come from NASA, NSF, and the Department of Defense Congressionally Directed Medical Research Program (DOD CDMRP), among others. He is currently supervising 2 Ph.D. students and 1 M.S. student, as well as co-supervising 1 additional Ph.D. student in Chemistry.

Dr. Bernards teaches our Chemical Engineering Capstone Design course. A great student mentor, Matt mentored a team of Chemical Engineering undergraduate students in NASA's Student Payload Opportunity with Citizen Science (SPOCS) competition. The team finished as one of the top teams, and their design was selected for funding and to be sent to the International Space Station (ISS).

Congratulations, Dr. Bernards !

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Undergraduate Degrees Awarded

Spring semester is when most students graduate. Many of them have already accepted positions in various industries pertaining to chemical and biological engineering while some are continuing on to graduate school and a few have been accepted to internships as a preparation for Medical School.

Biological Engineering
Anderson, Nicholas
Booker, Taylor P.
Carper, Anne M.
Casino Remondo, Bruno
Chard, Mairen E.
Graves, Lauren R.
Hansten, Alyssa D.
Inman, Sydney P.
Lewis, Jack S.
Phung, Melissa Y.
Reetz, David C.
Richmond, Guinevere D.
Rougeux, Steven M.
Stachofsky, Lindsey K.

Chemical Engineering
Allen, Jourdan C.
Anderson, Joshua W.
Bhusal, Rahul
Blake, Isaac R.
Bosse, Jonathan T.
Dunham, Alexis M.
Law, Aaron D.
Lee, Juhyung
Naes, Devan J.
Rowe, Nicholas O.
Snow, Jacob D.

Post Graduate Degrees Awarded

Student	Degree	Major	Major Professor
Andoni Bieter Lete	M.E.	BE	Brian He

Congratulations Graduates!

Student Awards

Outstanding Seniors

BIOLOGICAL ENGINEERING: Lindsey Stachofsky will be graduating with a degree in Biological Engineering with a minor in Mathematics. During her undergraduate experience, she has been an Ambassador for the College of Engineering, involved with the Society of Women in Engineering, competed with the University of Idaho Climbing Club, and has done research using plasma activated water in Dr. Sarah Wu's lab. She is also a member of the Pre-Engineering Pathway Technical Advisory Committee, where she works with industry and leaders in the community to provide career technical education opportunities for students on the engineering pathway at the Lewiston High School. After graduation, she will begin work as a Process Engineer for Archer Daniels Midland Company at their wastewater plant.

Lindsey Stachofsky

CHEMICAL ENGINEERING: Aaron grew up in Spokane, WA, enjoying the outdoors and as a competitive swimmer. Many of his family studied engineering at the University of Idaho, and he's been long aware of the university's strong engineering program. He first studied molecular biology and biotechnology in the life science department and performed research on antibiotic resistance in the laboratory of Dr. Eva Top, afterwards briefly working in pharmaceuticals manufacturing. There, he decided to return to U of I to study chemical engineering in lieu of a master's program in biology elsewhere. He has appreciated the support he's received from faculty and looks forward to applying skills gained in his upcoming career. Additionally, his experience tutoring and providing support to other students on campus has been very rewarding. He hopes to continue to learn throughout his career and hopefully find other ways to give back to his community and future students.

Aaron Law

Student Achievement Award

The Student Achievement Awards in Leadership and Service recognize individuals who have made contributions to student activities, campus and community life. Alyssa Hansten, a Biological Engineering student received the

Alyssa Hansten with her faculty advisor Dr. Nathan Schiele

Outstanding Senior award.

Capstone Design Projects

Spring semester keeps our seniors busy on capstone design projects. The National Academy of Engineering ranks UofI's Capstone Design Project as one of top in the nation. Students work on sponsored capstone design projects of their interest.

Capstone projects are often sponsored by an industry partner and we continuously look for new projects which are relevant for our students. To foster student education, the University has an extremely generous intellectual property (IP) policy to sponsoring agency by releasing the IP back to sponsoring agency at no cost. Capstone projects are usually the projects the sponsors don't have time to explore by themselves but have a great potential to improve on existing designs or to develop a new process or design prototype. Having talented young engineers look at a problem with fresh and bold idea has helped many industry sponsors develop viable products, or new tools. Any industry can sponsor a project by contacting the department.

The capstone teams with chemical or biological engineering students are listed below.

Chemical Engineering

Chemical Engineering Capstone projects, generally are not interdisciplinary.

1. Plastic Waste to Fuel: Recycling in Bali: Finding a way to recycle used plastic would improve waste and help the environment drastically. The goal is to develop a part of a process that could take recycled plastic and turn it into usable fuel.
2. Pyrolysis Oil Purification Design: Closing the Plastic Economy: (**Best Booths Award**) The goal is to simulate and design a purification unit to separate fractions of the plastic recycling products for reuse. In this project, improvements to the plastic recycling collection and sorting system for Bali, Indonesia, were recommended to improve throughput, affordability, and quality.
3. Pressure Swing Adsorption: Separation of Nitrogen and Oxygen from Air: (**Best Technical Presentations Award**) Pressure Swing Adsorption (PSA) is a common separation technique that is used to produce high-purity gas product streams that can be used in a variety of industrial applications. he PSA design team designed and assembled a fully functional bench-scale PSA that produces streams of oxygen and nitrogen. This bench-scale system will serve as a teaching aid for the future senior chemical engineering laboratories.
4. Optimization of the Mixstix Platform: The Mixstix platform is a product that allows anyone to send a simple science experiment into space. The goal is to redesign less expensive, easier to use, and better performing Mixstix platform.

Biological Engineering

Most of the projects listed below are interdisciplinary with one or more BE students: The link would take you their project page.

1. Leg Exoskeleton for Multiple Sclerosis: The goal of this capstone is to create an assistive leg exoskeleton that will aid in their client's ability to walk independently.
2. Mars Javelin: (**Best Booths Award**)The goal is to test a model payload on Earth for the sake of launching a model on Mars. This model will acquire valuable data for NASA that will allow further progress towards development of other projects relating to the exploration of Mars.
3. Infrasonic Wildfire Detection and Reporting Devices: Wildfires have become more frequent and continue to threaten the environment and lives across the United States. The project goal is to create a network of low-power, low-cost devices that can identify the sound unique to wildfires and then report an estimated location to first responders.
4. Evaluation of Biofilm Resistant Coatings for Spacecraft Water Systems: (**Best Technical Presentations Award**) Biofilm mitigation in spacecraft water systems is crucial for space exploration. The project goal is to create an experimental apparatus to test the viability of polymer coatings that will reduce bacterial adhesion and biofilm formation of two bacteria strains found at concerning levels in the International Space Station. The project will be sent

to the International Space Station so experimentation can occur in microgravity.

5. Stem Cell Tendon Bioreactor: Cells in our tendons experience stresses when we walk, run, and perform any mechanical movement. The shear stresses these tendon cells experience has the potential to impact their biological response. To study this response, the team designed a bioreactor system that can apply well -defined and controlled levels of shear stress to cells in cell culture. This project was funded from Charles and Julian Peterson Endowment Fund.
6. 3D Printed Flexible Spine Model for Drug Delivery to the Brain: (**Best Booth Award**) The goal is to design and study how drugs injected in the lumbar area of the spine travel through the cerebrospinal fluid via a 3D printed flexible spinal model. By studying the simulated fluid flow, this can assist healthcare workers in understanding and developing safer drug delivery techniques for future procedures. This project was funded from Charles and Julian Peterson Endowment Fund.
7. Measuring Nerve Response in Earthworms from Minimal Electrical Stimulus: Neurobiology has historically been a difficult subject to teach and provide hands-on labs for. Action potentials are the body's way of creating electrical signal through the nerves that acts as the starting point that results in muscle contraction. The goal is to design a device to record action potentials from earthworm nerve cells when they are electrically stimulated.

Student Scholarships

Undergraduate students are atomatically considered for scholarships based on the criteria established by the scholarship endowment fund. These scholarships are provided in additional to Go Idaho! scholarship offered from the University. Endowment funds are main source of student scholarships.

During Vandal Giving Day (April 4-5), the departmental faculty pooled together $1,000 as a matching fund for the "Jim Batdorf Chemical and Biological Engineering Scholarship Match Fund". We received over 100% for this match.

Jim Batdorf was a valuable Advisory Board Member, friend and supporter of the department. Jim passed away in 2022.

In total the department provided $115,000 to 67 departmental students for academic year 2023-2024.

Update on Lou Edwards Endowed Professor

Last year in February, we advertised for the Lou Edwards Endowed Chair Position. Unfortunately, the search resulted in a failed search. Internal analysis indicated we needed to offer higher startup funding and/or salary to attract more qualified individuals to apply.

The donors have generously provided over $2,000,000 towards this position. However, proceeds from only half of this amount is currently available to use, as the other half are bequests. The fund earns about $45K in annual revenue.

Savings from the last years' proceeds, and other funds will be used to bolster the startup funding and the salary line for this new faculty position. With some additional departmental resources and college contributions, we plan to readvertise this position in 2023 fall.

Moving Beyond Biodiesel

The University of Idaho is known for its pioneering work on biodiesel research starting in 1979 led by Dr. Charles

The biodiesel facility at J.W. Martin lab is being decommissioned

Peterson. The program eventually kindled nationwide biodiesel use and was part of Energy Independent and Security Act of 2007. About 2 billion gallons of biodiesel is produced annually in the US to blend with regular diesel.

The program was also converting waste vegetable oil from campus dining to biodiesel to be used in university vehicles. The proceeds from this helped the Vandal Clean Energy Club (VCEC) which involved many chemical and biological engineering studetns in exploring biofuels and other renewable sources of energy.

The J.W. Martin Lab, which housed the biodiesel program, will now host Deep Soil Ecotron units. The College of Agricultural and Life Sciences at the University of Idaho received $18.9 million in 2021 to study soil at depths greater than anywhere else in the world funded by National Science Foundation.

As a result, the University decided to discontinue the biodiesel research program, which is now a relatively mature program as it is a commercial fuel and also in part because of the lack of interest from funding agencies in traditional biodiesel research. The University plans to continue more advanced biofuel research in the future.

The biodiesel production facility and accessories will be auctioned from university surplus to interested biodiesel producers.

Undergraduate Research

Our undergraduate research program provide many opportunities for more hands on education outside of classroom setting and towards solving the real world problems. The department, in partnership with the Office of Undergraduate Research, funded two undergraduate research projects this semester. Chemical Engineering Students Kiaira Kimball and Katelyn Shadley worked under Emeritus Professor David Drown on advanced battery research.

Olivia Nielson (a 2nd year biological engineer) presented her research about cartilage tissue engineering at the World Congress on Undergraduate Research (WorldCUR) at the University of Warwick in the UK. Another student, Abby Fellows, was highlighted for her work on Studying Malaria Transmission working under Dr. Shirley Luckhart from department of Biological Sciences.

Community Involvement

Providing expert opinion on contemporary issues is a part of scholarship. Northwest Public Broadcasting (NWPB) partnering with PBS science series NOVA, a production of GBH, to produce and distribute multiplatform, climate-focused content as part of NOVA's Climate Across America initiative. Dr. Vivek Utgikar was one of the panelist in discussion about the effect of Lower Granite Dam removal on regional transportation, hydroelectricity, salmon population and alternative to electricity from sources such as micro modular nuclear reactor.

Welcome Dr. Jagdish Patel

Dr. Jagdish Patel joined the Department of Chemical and Biological Engineering as a tenure-track assistant professor in January 2023. Dr. Patel has bachelor's degree in Pharmacy and master's degree in Drug Discovery. He won a Ph.D. scholarship from the University of Genova, Italy, and obtained Ph.D. degree in Computational Chemistry at the Italian Institute of Technology, Genova.

Although Dr. Patel is new to the department he has been with the University of Idaho for several years. In the fall of 2015, he joined the Institute for Modeling Collaboration and Innovation (IMCI) at the University of Idaho as a postdoctoral fellow. In 2018, he was promoted and joined the Department of Biological Sciences as a research assistant professor. His lab is working on interdisciplinary molecular modeling methods to design proteins and computer-aided drug design. Recently, Dr. Patel received NIH COBRE funded grant of amount $226,026 through IMCI to study sequence-structure-function relationships in human visual photopigments. His proposed research has the potential for high impact in the field of human vision as it will lead to a better understanding of the

Message From the Chair

People often ask me "How are you liking your job as a chair?" I am not sure how to answer that question or what answer they expect, but I will try my best to answer that question here . Short answer: I like it very much. Of course, that does not mean everything is a smooth sail, and in fact that would have been too boring. The old saying "Obstacle is the path" has been my source of guidance.

There have been so many changes since I became the chair just two years ago and changes are not always easy. However, change is very natural or, "biological" if you will, and inevitable. The best choice we have is to guide the change towards the right direction. If changes are unguided or random, they are more likely to go wrong. Why? Because there are only a few ways to go right and many more ways to go wrong. Statistically speaking, it is more likely to go wrong if we just leave it to a chance. Inaction often means leaving to a chance. That is why we need to be proactive and make appropriate course corrections to stay relevant and avoid undesirable changes that darts towards us.

Like everything else, chemical engineering and biological engineering has its own set of strengths and weaknesses. For Biological Engineering, the strength is its prospect for growth. For Chemical Engineering, it is one of the most sought after degrees by chemical industries that have enjoyed relatively high salaries compared to other engineering disciplines.

Biological Engineering is relatively a new field that started after year 2000. With recent development of complex computer models , artificial intelligence, and data science that are made possible by high power computing technologies and other developments such as CRISPR/Cas9, genomics, bio-technology and other supporting technologies, many things are now attainable which weren't just a few years ago.

One weakness of biological engineering is its newness, and it is not as widely known. Additionally, there are similarly named degrees across the country such as biomedical engineering focusing on human health, bio-engineering to all life sciences, bio-molecular engineering focusing at molecular level biology, and biological engineering encompassing all including agricultural, energy, and environmental applications.

The weakness in chemical engineering is that it is perceived as only associated with the petrochemical industry. Nationwide, the enrollment of students in chemical engineering has declined in higher proportion than other engineering fields. A recent NASEM study "New Direction for Chemical Engineering" points toward fields such as biomaterials, drug discovery, decarbonization, and the water-energy-food nexus as areas of growth. These areas are right in between the cross roads of chemical and biological engineering.

Bringing some biological components in chemical engineering and vice-versa can expand horizons for both chemical or biological engineering. As the boundary between these two are fading, students can gain much with this crossover.

We are actively looking at building a complementary curriculum, supportive labs, and interlinked research that will serve both chemical engineering and biological engineering students better. The main obstacle we face is the very limited available resources. We want to utilize our precious resources so the program best serves our constituencies, that include current students and alumni.

We are counting on you; our alumni, our industry partners, to give your thoughts on what is the current need. Beyond typical education, what topic area would you be interested in if we could offer you such a course? Use the link below to share your thoughts.

Links

Alumni and friends' feedback:
forms.office.com/r/uQ4Qp4HMZA

Giving to Chemical & Biological Engineering:
www.uidaho.edu/giving