



BIOLOGICAL AND AGRICULTURAL ENGINEERING

LIFE LINE

Fall 2023



We develop knowledge and tools that inspire tomorrow's engineers to design sustainable water, food, energy, and agricultural systems among our ever-changing world.

From the Department Head

Greetings from the department heads office!

It is a great pleasure to bring you updates from the Department of Biological and Agricultural Engineering and highlights of our fall semester. For those whom I have yet to meet, I began work at the UofA on August 1, replacing Dr. Lalit Verma. He left a vast legacy in the department, having led it for nearly 23 years. I am extremely humbled to be in this position, and I am looking forward to helping the Department reach its fullest potential.



Throughout the pages of this newsletter, we will highlight the many wonderful things being accomplished by our students, staff, faculty, and graduates. We will use this forum as a connecting point for these groups in the future, along with our other modes of communication. Among the highlights and newsworthy items: Dr. Rebecca Muenich joined the department in August as an Associate Professor in the water area, Dr. Costello, VanDevender, and Li all completed their careers here, several members of the department were recognized with awards, and many of our faculty continue to be successful in securing extramural funding for their research programs.

A little about me: prior to joining the department, I spent the five years at the University of Nebraska as Executive Director of The Food Processing Center affiliated with their Department of Food Science and Technology. Prior to that, I spent 16 years in assorted R&D positions at McKee Foods Corporation in Collegedale, Tennessee. In those years, I was fortunate to follow Dr. Verma as President of ASABE in 2014-15. I spent three years here at the University of Arkansas in the Department of Food Science as a Research Assistant Professor, so returning to Fayetteville is quite special to me, and being a part of this department is an opportunity that I could not pass up. As many of you know, the faculty, staff, and students of this department are truly remarkable. One of the reasons for that is our unity around the common purpose of our work. Feeding and providing sustainable environments for our growing population is a truly noble and satisfying profession. I speak for our current department in saying that. We are excited about fulfilling our parts of that mission.

In addition to the highlights of our semester, you will also hear about our plans for the spring. Please know that alumni are always welcome to drop by the Department to say “hello” and reminisce. I know faculty would welcome your presence as guest speakers, if time permits, in their classes. I would personally love to get to know you and hear your story when I have the opportunity. Please feel free to connect with me on LinkedIn and other social media platforms and follow the BAE Department there too.

Woo Pig Sooi!

● Faculty

BAEG Welcomes new faculty!

Rebecca Muenich: Agriculture Offers Engineers Opportunities to Improve Sustainability

Agriculture is a good field for an engineer looking to have an impact on environmental sustainability, says Becca Muenich, associate professor of biological and agricultural engineering for the U of A System.

Muenich is a Northwest Arkansas native, so she knew a little about agriculture already. But following her bachelor's degree in biological engineering from the U of A in 2009, she completed her master's and doctoral degrees in agricultural and biological engineering at Purdue University.

"I never thought I'd learn so much about ag," Muenich said. "I tell my students all the time, if you want to make an impact, ag is a place to work on because it is the biggest water user and has the biggest land footprint. And I see all of that as an opportunity as an engineer to make this system we all rely on more sustainable."

Muenich returns to Arkansas from Arizona State University, where she was an assistant professor in the School for Sustainable Engineering and the Built Environment. She has more than 15 years of experience researching how environmental factors control water supplies and water quality in agricultural, urban and integrated systems.

Muenich is currently teaching the sustainable watershed engineering course for the Biological and Agricultural Engineering Department. She is also continuing research on projects carried over from Arizona State that are funded by the U.S. Army Corps of Engineers' Engineering with Nature program and the National Science Foundation's Science and Technologies for Phosphorus Sustainability program.



BAEG

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BAEG Welcomes new faculty!

Howell Succeeds Verma as Biological and Agricultural Engineering Department

Terry Howell Jr. sees biological and agricultural engineering as a hub for bridging the engineering needs of agricultural sciences and natural resource disciplines to sustainably feed the growing world population.

As the new biological and agricultural engineering department head, Howell brings 25 years of food industry and university research experience. He succeeds Lalit Verma as department head on Aug. 1.

The Department of Biological and Agricultural Engineering includes research and extension programs of the University of Arkansas System Division of Agriculture and research and academic programs of the College of Engineering at the University of Arkansas.

"Efficiency and sustainability are at the heart of what agricultural and biological engineers do," Howell said. "As a societal mission, we're trying to make sure we can feed the growing population, have enough clean water to use and consume for that growing population while making sure energy is abundant, and air and other natural resources provide for a high quality of life."

Howell said biological and agricultural engineers are uniquely trained to think about increasing productivity and reducing waste by using byproducts, whether in row crops or animal production.

"You put those two things together, and it makes for a pretty big playground for engineers, and there's a lot of opportunity and need there," Howell said. "For students, I think they resonate very positively with that. They can see themselves contributing to society in meaningful ways."

And that excites Howell about his new role as department head for biological and agricultural engineering. He sees it as a chance to expose the next generation of students to a career with an array of possibilities.

Muenich addition, continued...

In August, Muenich joined the Biological and Agricultural Engineering Department in the U of A College of Engineering and the Arkansas Agricultural Experiment Station, the research arm of the U of A System Division of Agriculture. "Dr. Muenich's hire by the University of Arkansas is a rare opportunity, a coup for us, to have someone who not only has an amazing reputation in her field but also cares deeply about being in the area," said Terry Howell, head of the Biological and Agricultural Engineering Department. "Our students will be enriched by the depth of experiences she brings to the classroom and her research. She will be able to relate to our students in a unique way as an alumna of the department, and the variety of experiences outside of Arkansas will allow her to bring fresh ideas to our department as well. I could not be happier to have her join us."



BAEG says goodbye to key faculty members

Lalit Verma, Biological and Agricultural Engineering Department Head, Retires After 23 Years

Lalit Verma, professor and department head of biological and agricultural engineering for the U of A System since 2000, retired July 31. His 23 years at the helm of the department have seen critical advancements in research and teaching programs.

"The most gratifying thing in my 23 years here has been creating and implementing the research, teaching and service programs for our citizens," Verma said. "Recruiting young faculty and facilitating the growth of their individual programs while contributing to the departmental goals has been very rewarding.

"The support and invaluable contributions of our dedicated support staff and faculty have been the reasons for our sustained successes," Verma said.

In retirement, Verma and his wife, Aruna, plan to spend time with their two grandchildren and take some overdue international trips.

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A reception to celebrate Verma's retirement was held on July 21.



BAEG says goodbye to key faculty members

Costello, VanDevender, and Li wrap up their incredible careers

Drs. Tom Costello, Karl VanDevender, and Yanbin Li concluded their careers at the UofA in late 2023. They arrived in the department in 1986, 1987, and 1989, respectively and were all part of a major revolution in the unit. They, along with their faculty peers at the time, were responsible for the department's name change and corresponding curriculum change. These efforts were instrumental helping the department navigate many challenges in the mid-90s and beyond.

"Having that much collective wisdom leave together will leave a gaping hole in our teaching, research, and extension programs" says Terry Howell, Department Head. He goes on, "They each have left a strong legacy for us to maintain."

Costello plans to remain in the Fayetteville area; he has many projects and activities to keep him occupied. He is finishing up a demonstration growth chamber project at the labs. His work on undergraduate academic programs was stellar, and he was a tireless advocate for our students.



VanDevender also has many projects around his property to occupy his new free time. He and his wife will continue to be advocates for the deaf community around Little Rock. Karl's work to help Arkansans navigate the challenges around animal manure management had high impacts in improving land and water quality.

Li and his wife are planning to relocate to the west coast in the coming months to be nearer to their kids. Li leaves the Arkansas Division of Agriculture as one of its most successful and prolific scientists in terms of proposal funding, publications, intellectual property, and other impact. The poultry industry benefited tremendously from his work.

If you would like to share well-wishes, their UARK email addresses are still valid.

● BAEG Life Line

Biological and Agricultural Engineering has a “latte” success in Giving Days

The College of Engineering launched its giving days on October 17th and 18th to raise scholarship funds for aspiring engineers.

The campaign's theme, "Brewing Innovation: It Doesn't Cost a Lot, Just a Latte," invited engineering alumni to give up their morning latte for a couple of days — with a suggested donation of at least \$10 — to support scholarships for students in their department of study. The college's advancement team set a bold goal of achieving a record-breaking 1,500 gifts over 48 hours of the campaign.

The team secured matching gifts for departments, and Dean Needy issued a challenge to the departments by promising \$5,000 in scholarship funds to:

1. The department that attracts participation from the greatest percentage of alumni, and
2. The department with the greatest percentage of first-time donors.

Biological and Agricultural Engineering alumni and friends responded very well. As seen in the graphic, our department raised over \$7000 in 2 days and was able to win in the first category! Mechanical Engineering had the highest number of first-time donors. In addition, with a corporate match and the prize money, over \$20,000 has been added to our scholarship fund! Thank you to all who helped elevate our department during this event.

The Department is working on a list of key needs that might be attractive to our alums for targeted giving. Once the list is curated, we will be intentional about sharing those needs- you might be interested in supporting initiatives that were valuable to you in your experiences here. Stay tuned for more details.

Please reach out to Linda Pate (lpate@uark.edu) if you would like to contribute to any of our scholarship opportunities:

Billy Bryan Scholarship Fund
Joel T. Walker Memorial Scholarship Fund
Carl L. Griffis Memorial Scholarship Fund
Biological and Agricultural Engineering General Scholarship Fund
Biological and Agricultural Engineering Student Support Fund

Total Gift Amounts

- **Biological & Agricultural Engineering - \$7,086.32**
- **Biomedical Engineering - \$2300.40**
- **Chemical Engineering - \$13,479.36**
- **Civil Engineering - \$7,995.44**
- **Computer Science & Computer Engineering - \$375.32**
- **Data Science - \$135.15**
- **Electrical Engineering - \$14,630.24**
- **Industrial Engineering - \$9,262.32**
- **Mechanical Engineering - \$14,165.76**



UNIVERSITY OF
ARKANSAS

College of Engineering



Faculty, Staff, and Alumni Making Headlines

Dr. Haibo Huang, who obtained an M.S. degree in biological engineering at the University of Arkansas in 2009 and now is an associate professor in the Department of Food Science and Technology at Virginia Tech, received the ASABE 2023 New Holland Young Researcher Award.



Dr. Abani Pradhan, who obtained a Ph.D. degree in biological engineering at the University of Arkansas in 2006 and now is a professor in the Department of Nutrition and Food Science at the University of Maryland, received the IAFP 2023 Harry Haverland Citation Award."

Dr. Peng Zhou started his postdoctoral research in September 2023, working on a mobile robot for sampling and a fluorescent biosensor for bacteria detection in a poultry processing plant to improve food safety and quality.



Faculty, Staff, and Alumni Making Headlines

Matlock Elected as Fellow in the American Society of Civil Engineers



Marty Matlock, professor of biological and agricultural engineering in the college of engineering, was elected to the status of Civil Engineers (asce.org). ASCE members elected to fellow status have made celebrated contributions as well as Fellow in the American Society and developed creative solutions that have enhanced lives. Just 3% of Society members hold this prestigious honor.

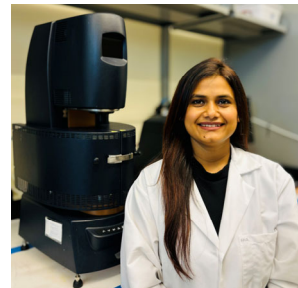
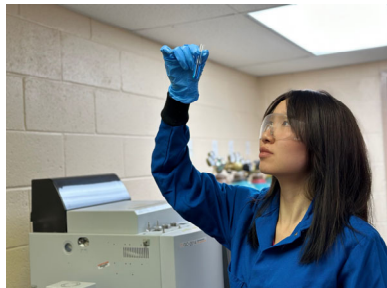
University of Arkansas receives Tribal New Beginning Grant from USDA to support Native American students.

USDA has awarded the University of Arkansas nearly \$500,000 to support the “Life from the Land Initiative to Recruit and Retain Native American Students at The University of Arkansas.” The project leaders are Dr. Marty Matlock, professor of Biological and Agricultural Engineering in the college of engineering, Erin Parker, director of the Indigenous Food and Agriculture Initiative (IFAI) in the Law School, and Dr. Michelle Evans White, Chair of the Department of Biology. The total project support with matching funds is just under \$1 million.

The Life from the Land Initiative will engage leaders from Native American governments, starting with project partners from the Cherokee and Muscogee Nations, to better understand how to serve the needs of Native American students. The Initiative will support a Native American Student Support director, working with UA student services. Native American youth are among the least represented in science, technology, engineering, and math (STEM) fields in the US. There are Four Challenges that are common for students from Tribal communities: 1) a sense of belonging; 2) a vision and purpose; 3) college preparation, and 4) economic support to complete the degree.

Faculty, Staff, and Alumni Making Headlines

3 Awarded Graduate Fellowships for the 2023-2024 Academic Year



Yihong Feng, Yiting Xiao, and Jaspreet Kaur were awarded Graduate Fellowships for the 2023-2024 academic year

NSF Phase II Grant Supports Research to Address Herbicide Drift with Eco-Friendly Additive



CelluDot LLC, a startup founded by engineering alumni, will be using a nearly \$1 million National Science Foundation grant to optimize a nanotechnology product they developed as doctoral students to mitigate herbicide drift, all in collaboration with the Arkansas Agricultural Experiment Station.

Environment, spray application practices and tank mix composition

can all cause herbicides to move off-target — or drift — resulting in unintended damage to nearby crops or other vegetation. CelluDot addresses this \$3.1 billion industry problem with a nanocellulose-based technology that keeps herbicides at the site of their intended use, according to Joseph Batta-Mpouma, Ph.D., CEO of CelluDot.

Batta-Mpouma said the \$959,510 National Science Foundation's Small Business Innovation Research Phase II grant supports the company's research to optimize and commercialize its nanocellulose-based formulation called BioGrip™, for herbicide applications. The all-in-one product has three functions: drift-reducing agent, volatility-reducing agent, and a surfactant, Batta-Mpouma said. BioGrip is made from forestry waste, like sawdust, rather than petroleum-based chemicals.

Faculty, Staff, and Alumni Making Headlines

The TCC Garden King Terrius Bruce Promotes Sustainability with Children's Book



Living in a food desert can be difficult. Food Deserts, or areas where there is extremely limited access to healthy and affordable foods, can be found all over the U.S. today.

It's one of the issues Terrius Bruce is working to help solve as an Environmental Dynamics PhD Candidate at the University of Arkansas.

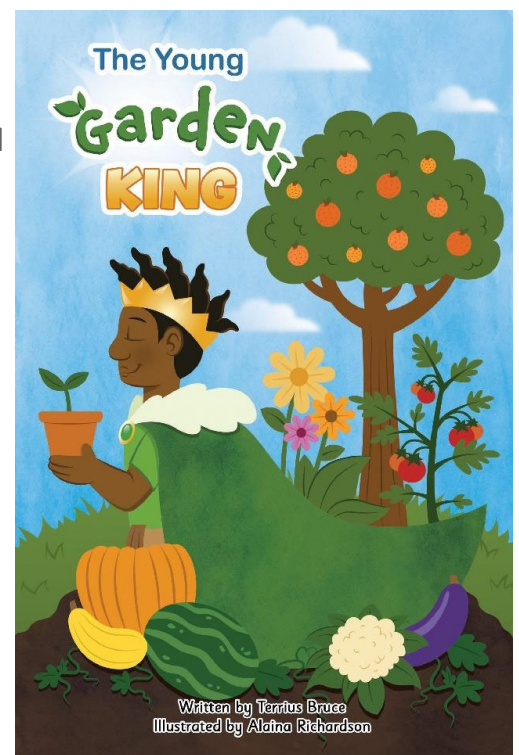
Bruce, who is a Tallahassee Community College alumnus, has a love for environmentalism and sustainability. However, he found it difficult to spread his message because the subject was mired in technical language. That's when he decided to simplify the message by writing a children's book that tells the story of Imhotep, the Young Garden King.

The book follows the titular Young Garden King, Imhotep, and his experiences combating a food desert through communal initiatives to grow healthy and nutritious food.

Bruce began the production of the Young Garden King six months ago, hoping to bridge this gap of understanding. He believed the ideas of healthy eating and sustainability were held back by excessive and unclear jargon that muddled the importance of the subject.

"If you speak on a certain level and to their surroundings or universal experiences like food, you can help more people understand your message," Bruce said.

For the creation of his book, Bruce partnered with the Historically Black Colleges and University Green Fund, a non-profit organization that shared his beliefs about sustainability. The organization placed him in contact with more like-minded individuals and companies, including artist Alaina Richardson and publicist JSJ Enterprises.



Study Seeks to Refine Knowledge About Climate Impact of Rice Farming

Three-year project will help NRCS decide incentives for farmers who implement mitigation strategies

A new project led by pioneering biological and agricultural researcher Ben Runkle seeks to refine scientists' understanding of how different rice-growing soils and irrigation conditions influence the production of methane, the potent greenhouse gas that is a primary contributor to climate change.

Rice is typically grown in clay-rich fields unsuitable for other agriculture but perfect for the worldwide food staple, which thrives in swampy conditions that also, unfortunately, produce plentiful methane gas. Flooding rice-growing fields also limits weed growth.

Runkle's ongoing research has experimented with allowing fields to dry out during the growing cycle rather than flooding them with water throughout. He and research collaborators have shown that farmers can reduce the methane produced by 64 percent without impacting yield by instituting carefully timed periods when rice fields are dried.

A group led by Runkle recently received a \$694,047 federal grant to further this research by exploring two areas of gaps in knowledge: how soil makeup and field slope impact these methane-reducing and water conservation strategies. The researchers also hope to show that differing rice cultivars have less influence on the amount of methane produced than other factors.

"We know from the past research that the soils of rice fields are very important in determining the greenhouse gas emissions that come off of those fields. What we don't have a really strong handle on is how much," Runkle said. "Rice can grow well in clay soil. What we're trying to target is quantifying clay content of soil as the kind of master variable that will help us control methane emissions."

The three-year research project is funded by the National Resources Conservation Service (NRCS). In addition to its grant, the University of Arkansas will provide a \$291,084 match and Zero Grade Farms of England, Arkansas, will contribute in-kind use of its farm fields valued at \$430,107.

The NRCS pays incentives to farmers who agree to various conservation practices, including those to reduce methane. The agency needs more information to help its staff make decisions about how to prioritize conservation activities among farmers, Runkle said. Runkle's group will deliver a fact sheet, training materials and a technical report guiding the interpretation and implementation from the research findings, focusing on methane-reducing actions.

The project aims to both evaluate existing conservation practices and help the NRCS structure future conservation assistance under varied soil and irrigation conditions. It's the first time in recent years that Runkle has received a technical assistance grant to produce research and guidelines for the NRCS.

“This type of technical assistance is new and exciting as a way to make an impact from our research. We will concurrently publish scientific papers from this data, but we will also translate that to forms that are accessible for farmers to implement,” he said.

The NRCS, which has agents in every county like the Cooperative Extension System, will distribute the information to farmers. Arkansas is the country’s leading rice producer, growing about half of U.S. yield, with California, Louisiana, Mississippi, Missouri and Texas producing the other half.

Momentum has been building for scientific-backed mitigations to address climate change, particularly in the past three years or so, Runkle said. He is encouraged by recent political and economic attention to the problem and believes support is growing for agricultural practices to become part of the solution.

“There’s more money available to help us look at fleshing out the details of how some of these mitigation strategies can work to reduce uncertainties for farmers and help prioritize where agencies like NRCS should spend its money,” Runkle said.

Government agencies often aim for better outcomes by providing incentives to row crop agriculture to make changes, Runkle said. In addition to government interests, private-sector companies that sell rice-based products are interested in improving sustainability in their supply chain, he said.

“This research will help generalize our findings from field-scale measurements across the landscape, helping to improve our understanding of the system and ultimately helping producers,” said Michele Reba, research hydrologist with USDA-Agricultural Research Service-Delta Water Management Research Unit, and collaborator on this project and others with Runkle.



Student Spotlight

Student Club Updates:

Fall Semester Recap:

Welcome Potluck at the Agri Pavillion to kick off the fall semester.

Our first Hamestring Trail Cleanup of the year.



A large group attended the **ASABE State Section Meeting & Tours**.



Our annual **Camping Trip**, this year we camped on Beaver Lake.



Bonfire before finals week at Dr. Howell's.



Tyler Young and **Avonelle Lindon** received grants from the Office of Undergraduate Research, in collaboration with the Honors College



Student Spotlight

Emma Moore— President of BAEG Student club

Where are you from?

Jasper, AR

What made you chose Biological Engineering?

Getting to go right into hands on projects, and the focus on the outdoors.

What do you plan to do with your degree?

I'd like to do design for solar energy systems, I'm looking into several energy internships at the moment.

What do you like to do in your spare time?

I like to garden, crochet, and play video games with my sister.



**Congratulations to the
Class of 2023!**

Undergraduates

Leo Black

Conor Germann

Mariel Kasman

Katherine Skiles



*We hope to see you this
Spring!*

