

Biosystems Engineering Newsletter



AUBURN UNIVERSITY
Biosystems Engineering

2022

A MESSAGE FROM THE DEPARTMENT HEAD

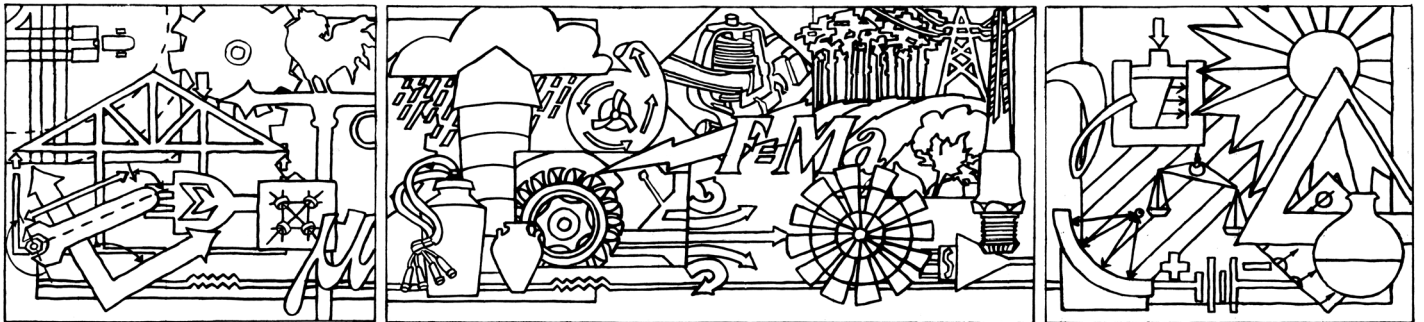


I am pleased to share the 2022 edition of the Auburn University Biosystems Engineering (BSEN) newsletter. Hopefully, you will agree that the amazing faculty and staff in the department are dedicated to fulfilling our land grant mission of providing a high-quality and family-centered environment for students, conducting world-class and innovative research, and developing and delivering impactful extension/outreach programs that form practical solutions to challenges faced in agricultural production which foster economic growth.

Our undergraduate student enrollment numbers have remained steady, and the enrollment in our graduate program continues to grow. I am appreciative of the diverse nations represented in our graduate student population. Several of these graduate students received awards this past year from university, regional, and national competitions. My faculty colleagues continue to secure grants from highly competitive and prestigious funding agencies (page 13) and publish in diverse peer reviewed journals, with several being high impact journals. According to academic analytics and in comparison with other peer programs, Auburn's BSEN department in years 2019 - 2021 ranked #1 in federal dollars per grant, and #1 federal grant dollars per faculty. I am particularly proud of these achievements by my colleagues at the faculty level.

I will end my remarks with this quote "Even if you're on the right track, you'll get run over if you just sit there" – Will Rogers. I am thankful for the BSEN faculty and staff that exemplify this quote by how they embrace and cultivate a spirit of "continuous improvement". I encourage you to read the rest of this newsletter. I am confident that you will enjoy exploring the amazing work of these outstanding BSEN faculty, staff and students. Thank you for your support of the department and War Eagle!

- Dr. Oladiran Fasina



AWARDS

Outstanding Student Award

Dylan Bowen - Engineering
Julia Palazolo - Agriculture

Boyd-Scott Graduate Research Award

Bijoy Takhellambam

Master's Student Award

Suman Budhathoki

College of Agriculture Grantsmanship Award

Dr. Sushil Adhikari
Dr. Brendan Higgins

Publication Award

Dr. Yi Wang

College of Agriculture Staff Award

Bobby Bradford

52% FEMALE



The highest female percentage of any engineering discipline at Auburn University.



A GROWING DEPARTMENT

New Staff



Erin Wittwer, Accountant

Erin graduated from Auburn University in May 2021 earning her BSBA in Accountancy. During her senior year at Auburn, Erin had the opportunity to work for Deloitte as an intern for their “United States Business Tax” team in London, England. Erin spent a year after graduation working for a non-profit organization in Auburn called Baby Steps. The mission of Baby Steps is to empower students on Auburn’s campus that face unexpected pregnancy and help them graduate while parenting. Erin had the privilege of living alongside these women and babies; fulfilling the role of “Live-in Support”. In the Biosystems Engineering department, Erin serves as the primary accountant

where she handles financial transactions as well as oversees expense vouchers, invoices, purchase requisitions, and other departmental transactions. Along with her usual staff accountant duties, she acts as a research administrator for the department by assisting with grant proposals and awards.



Devontae Lindsey, Multimedia Specialist

Devontae graduated from Auburn University in December 2020 earning his BA in Visual Media Studies. During his sophomore year, he worked as a Video Producer for Alabama Cooperative Extension System and started his own freelance business, Crown Vision Productions. In 2019, Devontae worked as the Communication Specialist for the Auburn University Office of Sustainability where he focused on videography and motion graphics. He also served as the Creative Director of Eagle Eye TV where he produced the Tigers Talk talk show. Devontae returned to Alabama Cooperative Extension System after graduation as a temporary employee Video Producer. He partnered with a

colleague to create “Heading to the Hare”, a campaign which highlighted the collaboration efforts between Alabama Extension and Auburn Athletics. The campaign was submitted to the Association of Communication Excellence and received the gold award for social media videos. In the Biosystems Engineering department, Devontae serves as the social media manager, photographer, videographer, graphic designer, website developer, and print publisher.

New Faculty



Dr. Hossein Jahromi, Assistant Research Professor

Dr. Hossein Jahromi received his bachelor's and master's in Chemical Engineering from Shiraz University and the University of Kerman in Iran. Dr. Jahromi joined the Auburn family as a post-doctoral student in 2019. Given his background in chemical engineering, his specific research interest will be in heterogeneous catalysis, thermo-chemical conversion of bio-based feedstock, and the development of eco-friendly fuels and bio-products. In his professional career, Dr. Jahromi developed a patent on catalyst manufacturing from red mud (a waste from alumina industry) that has been commercialized.

He also has published over twenty peer-reviewed articles in high impact journals.



Dr. Tanzeel Rehman, Assistant Professor

Dr. Tanzeel Rehman joined the department in August 2022 after completing his Ph.D. in Agricultural and Biological Engineering at Purdue University. He also attended the University of Agriculture in Pakistan for both his bachelor's and master's degree. Dr. Rehman's expertise includes the use of hyperspectral imaging and artificial intelligence for predicting the phenomic characteristics of corn and robotic spraying systems for herbicide application. At Auburn, he will establish a research program on the use of imaging sensors, proximal devices, computer vision, robust data mining algorithms, artificial intelligence, and robotics for smart horticultural applications. The goal

is to help farmers who utilize fruit, vegetable, nursery, landscape and greenhouse production systems minimize the labor costs, non-targeted pesticides application, and improve inventory management and production efficiencies.

PROMOTIONS



Jon Davis, Senior Lecturer

Since joining our department as a Lecturer in 2017, Jon Davis has received several teaching awards. These include the William Walker Teaching Award for Excellence (College of Engineering), and The Dean's Award for Excellence in Instruction (College of Agriculture). He has also been a four time winner of the Outstanding Faculty award in the department.

Mr. Davis's research is focused on engineering education and improving outcomes for all types of students. He is passionate about empowering students to synthesize and have a deeper understanding of the practical applications of what they are learning to the broader engineering field.



Dr. Brendan Higgins, Associate Professor

Dr. Brendan Higgins joined the department in 2016 as an Assistant Professor of Bioprocess Engineering. His research program focuses on utilizing algae and bacteria for waste remediation to improve water quality and convert wastewater to bio-fuels and chemicals. He is also the director of a new NSF-REU program that focuses on bioprocessing and collaborative research.

Dr. Higgins has an outstanding record of published work and has authored/co-authored 33 peer reviewed articles. He has secured over three million dollars for his research program from competitive and prestigious agencies such as NSF, USDA-NIFA, and USGS. Dr. Higgins is passionate about involving a diverse group of undergraduate students in research.

2 MAJORS

Biosystems Engineering

Bioprocess Engineering

Ecological Engineering

Forest Engineering

Biological & Agricultural Technology Management



ADVISORY COUNCIL



ABOUT

The Biosystems Engineering Advisory Council is comprised of leaders from Alabama's agribusiness and forest product industry sectors, along with representatives from other private and public engineering and business industries.

OUR MISSION

To foster a high level of excellence in the Department of Biosystems Engineering, the Advisory Council supports interactions between stakeholders and the engineering community, provides input on academic issues, supports and promotes educational programs and facilities in the department, recognizes the significant achievements of alumni and supporters, and assists in fundraising activities.

OPEN DOOR POLICY



FACULTY SPOTLIGHT

Dr. Timothy McDonald, Professor

TELL US ABOUT YOURSELF

I was born in Aiken, South Carolina, and attended high school in Lugoff. I enrolled at Clemson University in 1977 to pursue my bachelor's and master's degree in Agricultural Engineering. While obtaining my master's, I got married and had my first child. I began to look for a job after graduation and landed a USDA apprenticeship that paid for my Ph.D. at Purdue University. In 1987 I graduated from Purdue and moved my family to Clay Center, Nebraska.

There, I started work at the Agriculture Research Service researching animal thermal environments and behavior with swine and cattle. Five years later, we moved back to the south, and I started working with the US Forest Service in Auburn, Alabama. Soon enough, the Biosystems department advertised a faculty position in 2002, and I've been working here since.

WHY AUBURN UNIVERSITY?

I always collaborated with the faculty of the Biosystems Engineering department when I was working in forest service. I had a great impression and really liked the people in the department. When a faculty member left for the University of Kentucky, I applied and was hired.

TELL US ABOUT YOUR INDUSTRY EXPERIENCE

I had friends back in Lugoff, South Carolina whose parents were foresters and would hire us to work during winter and summer breaks. I loved being out in the woods preparing sites and planting trees. My gears shifted when I got married and had my first child so we moved to Nebraska. When the opportunity came to move to Auburn, my experience working in forestry when I was younger helped out a lot. I applied for the position at Biosystems and never looked back.

TELL US ABOUT BIOSYSTEMS

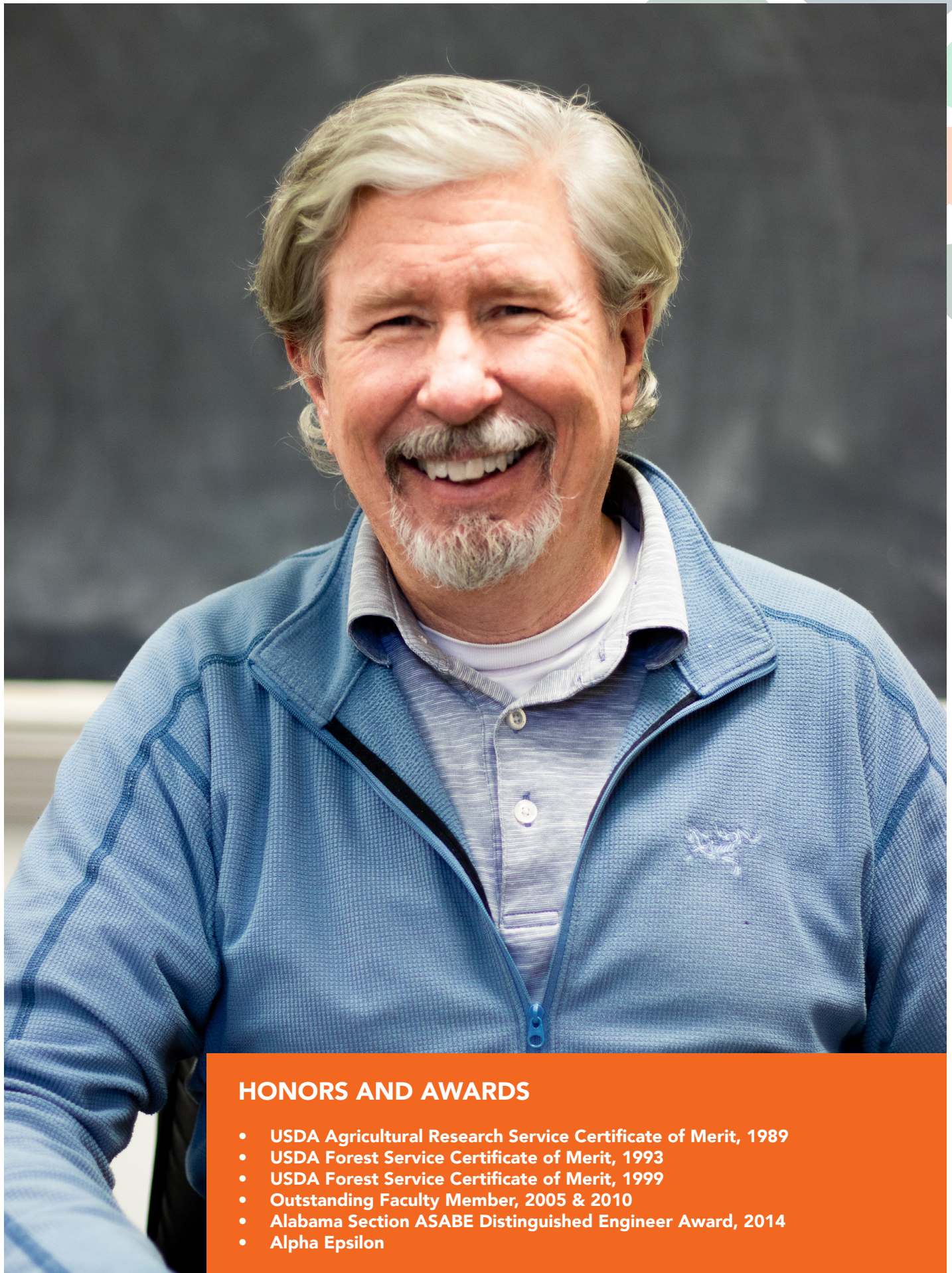
Biosystems Engineering is relevant, interesting, and challenging which makes for a good profession. It's relevant in the sense that you deal with the environment and the production of the things we need such as food and water. It's challenging because you deal with things that are biological in nature and those are hard to characterize from an engineering stand point which makes it interesting as well. People, animals, and trees don't lend themselves to be described by an equation. So you must develop methods to deal with that variability you see in nature.

BEST PART OF THE JOB?

Number one, it's the people I work with. I enjoy my colleagues. We've always had great leadership, participation, and collaboration. Number two is the students, of course! They challenge me and provide a different perspective on raising my own children. Being able to work in an environment where your day is never the same twice, and returning to my forestry background makes this the best job.

ANY ADVICE?

Some sound advice I received when I was growing up was to be persistent. Know that if you keep pushing and plugging, you will achieve whatever you set your heart on. However, knowing your goals is the other half of it. When I was in graduate school, I had ideas of what I wanted to be and what I wanted to do. Needless to say, all of them were wrong. I ended up choosing a path that got me well away from where I thought I'd be and everything worked out in the end. Set your goals and keep pushing until you meet them.



HONORS AND AWARDS

- USDA Agricultural Research Service Certificate of Merit, 1989
- USDA Forest Service Certificate of Merit, 1993
- USDA Forest Service Certificate of Merit, 1999
- Outstanding Faculty Member, 2005 & 2010
- Alabama Section ASABE Distinguished Engineer Award, 2014
- Alpha Epsilon

BIOSYSTEMS RESEARCH FOCUS

Emerging Systems

- Ag Systems Modeling & Data Analytics
- Renewable Energy in Ag Systems
- Sustainable, Resilience & Circular Ag Systems
- Climate Smart Ag and Forest Systems

Smart System for Production Ag & Forestry

- AI-based Imaging Technology for Plant Phenotyping
- Proximal Soil Moisture Sensing for Precision Irrigation
- Autonomous Agricultural Robots
- Precision Agriculture and Forestry
- Sustainability of Forest Operations

Controlled Environment in Agriculture

- Precision Animal Management
- Smart Poultry & Livestock Housing Systems
- Smart Horticulture Greenhouses
- Recirculating Aquaculture Systems Engineering
- Water & Energy Conservation in Confined Systems
- Spatial Sampling & Analysis

Bioprocess Engineering

- Biological Waste Treatment & Valorization
- Bio-fuels & Biochemicals Production
- Metabolic Engineering & Synthetic Biology
- Lifecycle Assessment
- Algal-bacteria Bioprocesses
- Pathogen Detection & Control
- Biological Materials Preprocessing & Standardization
- Post-Harvest Technology
- Biodegradable & Active Packaging Materials
- Food & Process Engineering

Ecological and Water Resources Engineering

- Ecological Engineering
 - Algal Bloom Prevention
 - Ecological Systems Modeling
- Ecological Systems
 - Aquatic System Engineering
 - Agricultural & Landscape Irrigation
 - Water Quality and Quantity Modeling
 - Erosion & Sedimentation Control
 - Fate & Transport of Nutrients in Environment
 - Watershed Analysis & Management
 - Non-Point Source Pollution
 - Nutrient Management & Nutrient Recovery from Wastewater
 - Ecological Waste Treatment
 - Sustainable Water Reuse for Irrigation
- Climate Variability
- Low Impact Development

RESEARCH GRANTS

TITLE	AGENCY
Development of a Bacterial-Algal-Zooplankton Process for Conversion of Agricultural Waste into Aquaculture Feed	NIFA
Research Experience through Collaborative Teams in Bioprocessing for Conversion of Waste into Products Value	NSF
Elucidating Colloidal-Facilitated Phosphorus Migration in Soils	NIFA
Innovative Approach to Characterize Colloidal-Facilitated Heavy Metal Transport from Land Applied Animal Waste	NIFA
Use of Bio-char in Ag Systems	USDA
Fluidized-Bed Gasification of Coal-Biomass-Plastics for Hydrogen Production	DOE
Developing a Circular Bio-based Framework for Architecture, Engineering and Construction through Additive Manufacturing	NSF
An AI-based Ground Robotic Vision System for Automated Inventory and Quality Assessment of Barefoot Seedlings in Forest Tree Nursery Production	NIFA
Effects of Environmental Conditions in Live Production on Production Efficiency and Product Quality in Commercial Poultry	USDA
Light-Dark-Inducible Suicide Bio-Circuits for the Containment of Recombinant Microorganisms	NIFA
Systematically Engineer Clostridium for Efficient Ester Production	NIFA
Research on High Pressure Combustion in Micro-gravity	NASA
Bio-production and Evaluation of Renewable Butyl Acetate as a Desirable Biolendstock for Diesel Fuel	DOE
Identification and Modification of Pathogenicity-Associated Genes of Virulent Aeromonas Hydrophila using Crispr-Cas9 System	ARS
Downed Timber Research	USFS
Aoml-Ngi South Florida Water Quality Data Analysis: Phase 2	NOAA
Bonnet Carre Response and Ms Western Sound Science Collaborative	USDI
Refining an Environmental Fluid Dynamics Code to Hindcast Standed Dolphin Trajectories	USDI
Developing Sustainable Aquaponic Production Systems	ARS

95%

**Job placement
within six months
of graduation.**



BIOLOGICAL & AGRICULTURAL TECHNOLOGY MANAGEMENT

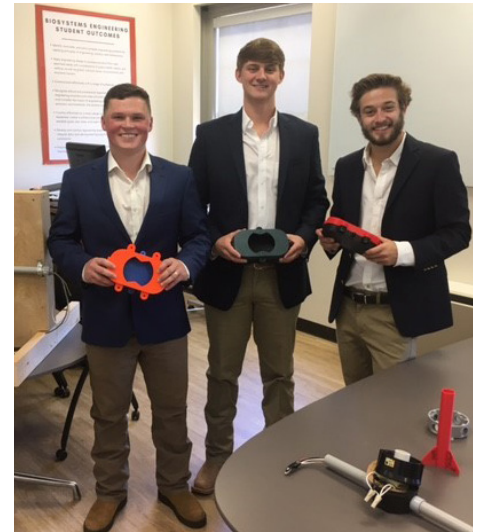
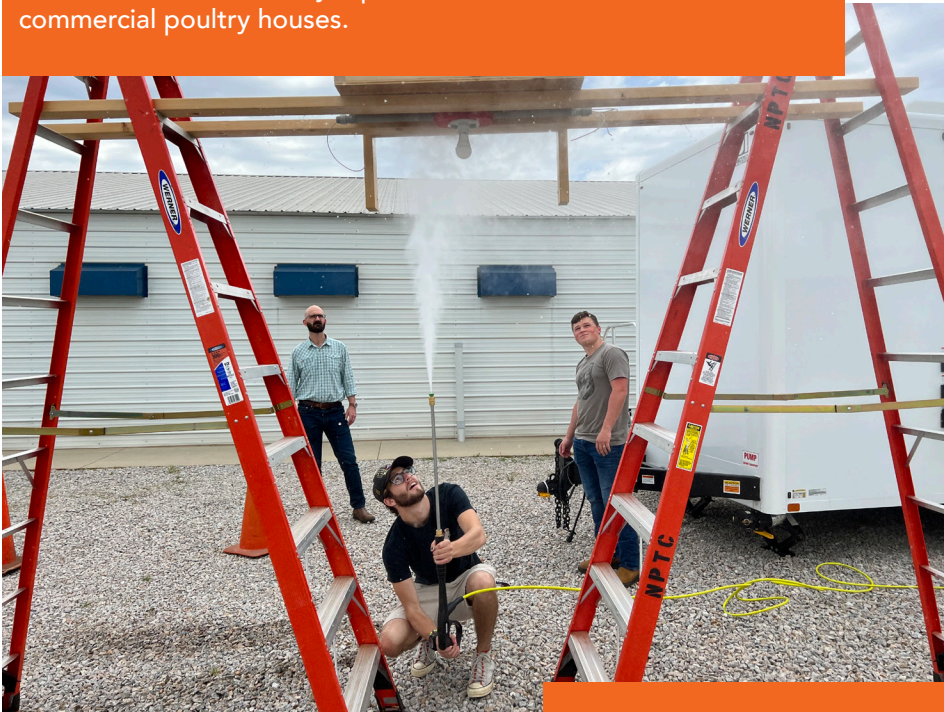
Biological and Agricultural Technology Management (BATM) is an engaging hands-on major that teaches students the process of designing and building agricultural and biological equipment using modern technology.

This major was added as a new curriculum choice in Fall 2019 and enrolled two freshmen and three upperclassmen. These students graduated with the first ever Auburn BATM degree in Spring 2022 and all are currently employed. Our first graduates received jobs as a trainee manager at Bonnie Plants in California, a manager in-training at a lumber company in Alabama, and the other is currently enrolled as a graduate student continuing work with the Auburn Biosystems Engineering faculty.



Now, there are over 30 students enrolled as BATM majors. Students take a variety of courses in technology, science, and business management that help them manage and develop solutions to the technological challenges facing modern agricultural and biological systems. Our faculty members work hard to ensure that students learn useful skills that are applicable across a variety of industries, such as 3-D computer modeling, sensors and instrumentation, electrical and mechanical systems, and GPS/GIS. BATM students are hands-on problem solvers which is a benefit to almost every industry.

During the students' capstone course, they used modeling software and 3-D printing to construct a ceiling mounted electrical light box that can conveniently replace the ones that often break inside commercial poultry houses.



RESEARCH EXPERIENCE FOR UNDERGRADUATES

The first summer Research Experience for Undergraduates (REU) - Collaborative Teams in Bioprocessing for Conversion of Waste into Products of Value was held in 2022. Ten undergraduate student fellows participated in ten weeks of fast-paced intensive research experience coupled with professional development activities. In addition, the interdisciplinary fellows met weekly for professional development activities and for communication skill building.

Through this interdisciplinary project, REU students engage in rich learning opportunities across six major academic fields: Biosystems Engineering, Chemical Engineering, Forestry, Fisheries, Horticulture, and Pathobiology. This site also promotes the REU fellows' professional development through diverse learning activities and hands-on workshops focusing on teamwork best practices, research practice, scientific writing, literature evaluation, and field trips to project-relevant sites. This opportunity allows undergraduates to experience the scientific research process, make connections to further their career, and work directly alongside some of the most intelligent minds in their field.



The objective of this project is to integrate undergraduate students in team-based research projects focused on converting biological wastes into products of value. For any questions about this opportunity, contact Dr. Brendan Higgins.

GRADUATE STUDENTS



QICHEN WANG

I started my biosystems journey in July 2017 after receiving my masters from Stone Brook University. I've always wanted to contribute to protecting the environment. Biosystems not only points out the environmental issues, but also provides solutions for these issues.

During my journey, I focused my research on discovering ways of enhancing the efficacy of waste treatment systems. Current waste treatment systems rely heavily on the environment to digest excess pollutants such as nutrients, residue organic compounds, greenhouse gas, etc. The increasing human and animal population/density in cities and farms challenges existing wastewater treatment systems. Longer and more expansive treatment processes are required to barely achieve the minimum discharge limit for wastewater treatment. My research is focused on developing highly efficient low-cost treatment processes that can be integrated into the existing systems.

My current work includes understanding the interactions of microbial community in aquaponic systems. I am also developing biotreatment processes that minimize the waste from aquaponic systems.

Awards and Achievements

- Auburn University Outstanding International Student, 2021
- Outstanding Publication Award, 2020



TAWSIF RAHMAN

My biosystems journey started with the bio-fuel study during my masters program in South Korea. When I started enjoying the unique research field, my master's course came to an end. I searched for a Ph.D. position and found Auburn through an online wiki page titled "List of American Universities and Colleges". Since Auburn, Alabama was at the top of the list alphabetically, it didn't take long to find bio-fuel research in the biosystems department at Auburn University.

My research focuses on carbon neutral bio-fuel production from the biomass and other organic wastes. The whole process takes place in an enclosed reactor under high pressure and temperature for a few minutes to several hours, whereas nature takes millions of years to accomplish the same goal. So far, I've used municipal sewage sludge, algae, forest residue, and poultry litter as feedstocks for bio-oil production. However, the fuel quality is not up to the mark with petroleum crude oil. My job is to figure out how to improve the oil quality with maximum production. Today, I'm working with municipal solid waste. It's exciting and interesting to turn daily waste into liquid fuel.

Awards and Achievements

- Two published Ph.D. objectives
- Four published research articles as co-author

ALUMNI STORIES



"When I chose my major at Auburn, I wanted to work in solar energy and biosystems was the right route. Four years later, my interest in solar died out, but my love for biosystems remained. You can't find a more close-knit, encouraging group of professors and peers. I still keep in touch with my biosystems peers and professors today. As a student I appreciated the open-door policy instead of having to set up a time to meet with my professors. This department teaches outside the classroom; taking you to creek for testing or a trail to view different types of erosion. Biosystems Engineering plays a pivotal role in many industries, and if you put in the work, you'll find a career that you love."

- Julia Palazzolo



"I began my college career in COSAM to become a surgeon. I was encouraged to look into engineering and I began pursuing a biosystems engineering degree. It increased my love for outdoors and I learned how I could do my part to improve the environment. I found a group of students who had the same desire to work hard in classes and enjoy the clubs and activities Auburn has to offer. I was encouraged to work harder everyday by my professors who went out of their way to develop relationships with their students and understanding our potentials. The small but growing department allowed me to grow as an individual by providing me with challenging classes, as well as a strong support group of faculty and students."

- Hannah Bartels



"As part of a high school engineering competition, we were tasked with finding a way to utilize wastewater. We proposed using microbial algae to eat excess nutrients and turn the algae to useful products. This research heightened my interest in biosystems, and the bio-processing option fit perfectly for how I wanted to apply engineering to these concepts. Some of my favorite moments in biosystems were learning how to model fluid and solid motion, storage, and production. I had the chance to apply these principles to topics as varied as the transportation of potato chips in Bulk Solid Transport to the separation of hydrothermal liquefaction products in Biomass and Bio-fuels Engineering. Additionally, the camaraderie with my peers and teachers during group projects prepared me to be an effective team member as I begin my career."

- Grady Freeman



"My favorite part of Biosystems was being a part of a community of faculty, staff, and students that were passionate about their work and took pride in making a difference in the world. It was a privilege to be surrounded by driven people for different backgrounds. I believe choosing biosystems opens more doors for students than they realize. I changed my major my junior year because I was interested in ecological engineering/environmental remediation. As time goes on there will be more employers from outside the agricultural industry that acknowledge biosystems graduates for their work and preparation. While I didn't start in this program, I couldn't have chosen a better place to finish."

- Sean Miller



"I came into my freshman year at Auburn, not sure exactly what I wanted to major in. I saw the Biosystems major and was drawn to it because it combined both engineering and biology. It was a great choice. The BSEN department really helped me work through my classes as I learned how to become a college student and helped make the best of classes during the pandemic lock-downs. I appreciate all the professors in BSEN who knew me by name. The Biosystems department was amazing because of the professors and fellow students who did their best to help each other. I would recommend biosystems to anyone who enjoys engineering and biology and wants to work hard while meeting exceptional people."

- Drew Johnson



"Through my love for the environment and serving others, I found Biosystems Engineering to be the perfect fit for me at Auburn. I was looking for a smaller department of welcoming and supportive professors that would allow me to explore many different disciplines within engineering. The entire BSEN department was able to give me exactly that, along with many lifelong friends. My favorite part of this major was the community among the students and staff. The small class sizes allowed me to get to know the majority of my peers as well as form relationships with my professors. Having welcoming professors that were always willing to give meaningful support, whether it be for a class, club, or post-grad advice, was an amazing aspect of the BSEN department."

- Emily Miller



"As a recent alumnus, my favorite part of BSEN was the relationships I formed within my major. These relationships allowed me to be more personally involved with activities inside and outside of the classroom and gave me a stronger desire to perform well. I am grateful to have had such passionate professors who delivered their lessons enthusiastically which made me genuinely curious to further my learning on certain topics. My most fulfilling moment as a BSEN alumnus is crossing the graduating stage and embracing the professor of my most challenging classes, Dr. Fasina, who is hands down one of the most knowledgeable professors I've ever had."

- Joe Saia

STUDY ABROAD

Charley Golden



"This past summer, I had the chance to study abroad in Rome and Madrid and get a business minor. This experience was life-changing and unforgettable, from touring the Vatican City, watching a bullfight, my weekend trip to London and so much more. I have many memories that

I will carry with me for a lifetime! I signed up for this study abroad not knowing anyone that was going and I'm happy didn't. I met so many amazing people that I was excited to see on the Auburn campus that fall. Even if you've only thought about studying abroad, I could not recommend this experience enough!"



Alma Smith

"From someone who has never been out of the county before, I can without a doubt say that my study abroad experience in Italy was the best trip I've ever encountered. I was in Rome



studying art for my minor. My time there consisted of attending churches and museums admiring the works of art and immersing myself into the culture. We took a weekend trip to Capri to see beautiful gardens, visited Florence and a small town called Orvieto. I got to see the countryside and the wide-ranging mountains and curvy rivers. My experience not only expanded my horizons but allowed me to make new friends and make new memories that I'll cherish forever."



Jenifer Rodgers



"This summer, I traveled with the Biological and Agricultural Engineering department from Texas A&M to Belgium. We stayed in Leuven, Belgium, to take classes Monday through Thursday and traveled Friday through Sunday. Once a week during school hours, we had a guest speaker as well as field trips to different Belgian companies to see how Belgium handles waste as well as the steps they take to reduce waste and air pollution. My personal

favorite was EcoWerf, a composting facility that provides services for waste prevention, collection, and treatment. Belgium was a great experience as I got to learn about Europe's environmental practices as well as travel around Belgium with new friends!"



Justus Smith

"This summer, I traveled to the community of Saloj, Guatemala, with the Auburn Student Chapter of Engineers without Borders (EWB). Over the course of two weeks, my team and I trenched, glued, and calibrated a 3 km water source for an area lacking significant infrastructure.

Leading this project from conceptualization to implementation taught me many skills, but what really stuck with me was the immense gratitude the community showed. We were showered with gifts, handshakes, and the local marching band even performed in celebration! It was life-changing to see the significance our engineering had. I am excited to continue my work with EWB as we take up a new project in a similar location."



Grace Wood



"This summer, I had the wonderful opportunity to study in Innsbruck, Austria for six weeks. Innsbruck is a small town in the Austrian Alps, and it's centrally located in Europe. We went to school Monday through Thursday, then we were free to travel wherever we wanted on the weekends. On my weekend trips I went to Munich, Genoa, and Cinque Terre, Paris, Prague, and Ljubljana. Each of the cities were vastly different from the rest, so I got to experience multiple cultures, languages, architectural styles, and people. My favorite two places were Paris and Prague. After the amazing weekend trips, we returned to Innsbruck for classes and experiencing what it would be like to live in Austria. I had the most amazing summer in Europe, and so lucky I had this experience."



Ann Inskip



"I had the privilege of traveling to the small community of Pararia, Bolivia, as the Bolivia team lead for Engineers without Borders (EWB) to help implement an irrigation system for agricultural purposes. Six others and I spent our days hiking up mountains to survey the surrounding area, using our Spanish knowledge



to communicate to others on how to connect pipes, and learning about the community lifestyle. This trip has been underway for the last two years and every moment was worth it. Seeing our team work seamlessly with the community and watching our project come to fruition was an overall fulfilling experience."

Audrey Gray



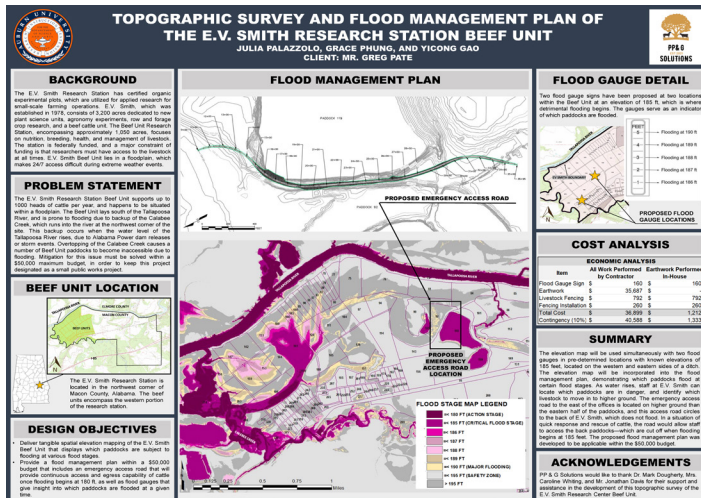
"This summer, Belgium offered me many valuable academic and cultural experiences. From adapting to the culture to visiting local family farms and municipal water treatment facilities. There wasn't a second that passed without learning something new. We spent three days of the week in class, one day of the week on a local field trip, and our weekends traveling within Belgium or anywhere in Europe. The course content covered wastewater treatment, animal and human

waste management, and air pollution control practices while providing applicable comparison and contrast to the systems used in the U.S. vs. in the European Union. Some of my favorite trips included a visit to one of the largest pig farms in Belgium and to Ecowerf. Additionally, we had the opportunity to sit in on several seminars with individuals that work in the different sectors we were learning about. The experiences I had during this program helped me immensely in determining what my academic and professional goals are going into my last year. I wouldn't trade this experience for the world!"



SENIOR DESIGN PROJECTS

Our students solve real world problems



E.V. Smith Research Station Beef Unit Flood Alleviation

When the Tallapoosa River outlet, a ditch that runs throughout the property also backs up. This ditch flows underneath a frequented access road within the beef paddocks. In times of extreme flooding, it can top over the road and cut off access to paddocks beyond that point. Emphasized is a detailed elevation mapping that demonstrates flooding as well as the addition of an implement that allows for an alternative egress route or access route for staff and cattle. Topographic analysis is used to indicate which paddocks are located at higher elevations and which are in areas of flooding concern.



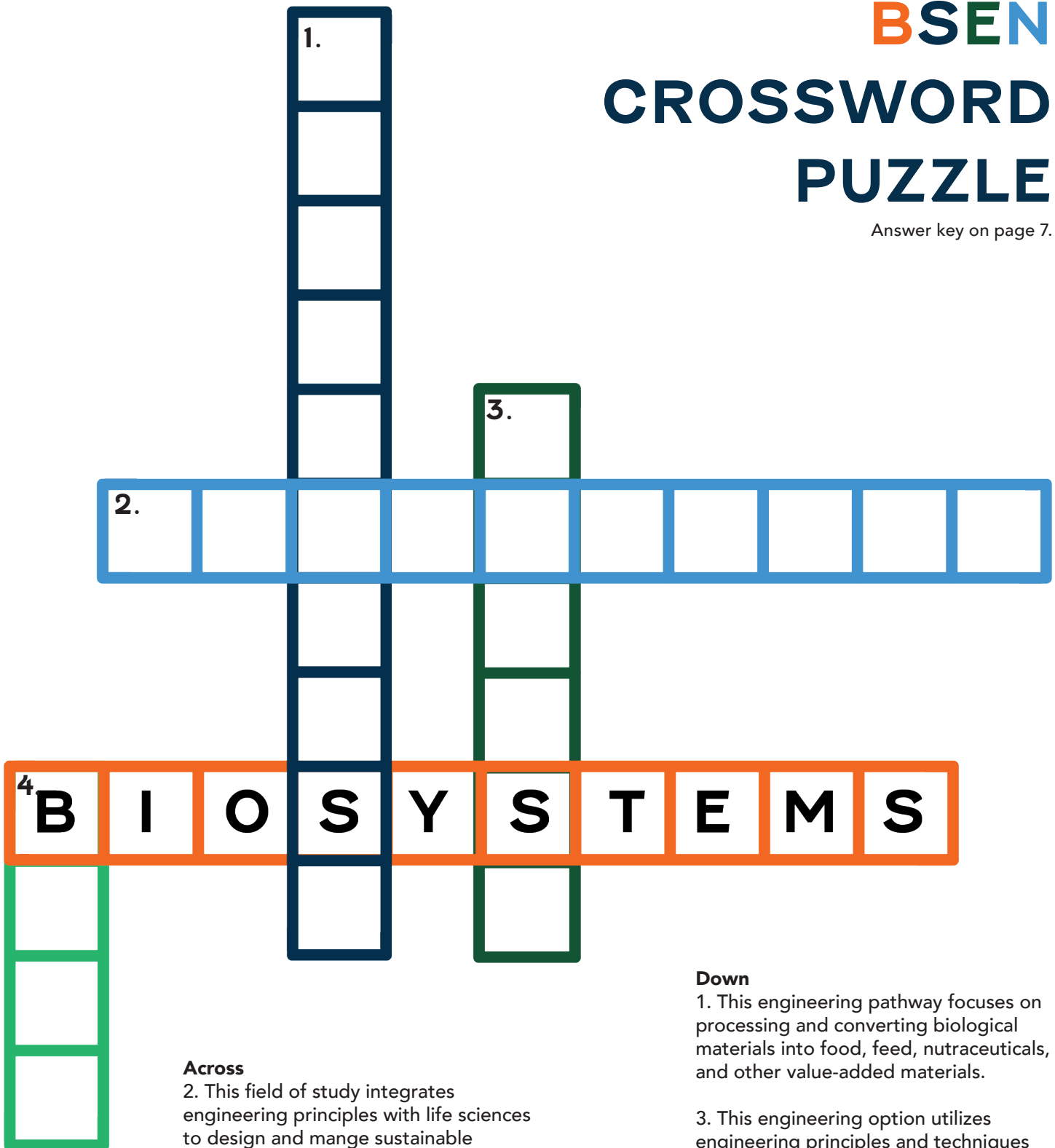
Retrofitting Floats for Storm Water Protection of Off-Bottom Oyster Farm

The issue that this design aims to address is the inefficient process of storm protection. Currently, farmers must sink lines of cages by individually filling each air compartment with water to prevent any major storm damage. After implementing storm protection measures, the retrieval process for these cages proves even more difficult. In deeper waters, farmers must retrieve these cages from the depths by using a boat that has a winch attached, evacuate the water-filled pontoons, and place the cages on the surface again. The current process of storm protection hinders the development of the premium half-shell oyster industry along the gulf Coast.



CROSSWORD PUZZLE

Answer key on page 7.



Across

2. This field of study integrates engineering principles with life sciences to design and manage sustainable systems that benefit humans and the environment.

4. This engineering option produces engineers with knowledge in the production, processing, and conversion of biological materials, as well as protecting the environment.

Down

1. This engineering pathway focuses on processing and converting biological materials into food, feed, nutraceuticals, and other value-added materials.

3. This engineering option utilizes engineering principles and techniques for sustainable management and maintenance of trees, soil, water, and other natural resources.

4. This heroic degree produces graduates that can manage and develop solutions to technological challenges in food, agricultural and biological systems.

BSEN BY THE NUMBERS

FALL 2022

UNDERGRADUATE:

192 **33**

ENGINEERING STUDENTS TECHNOLOGY STUDENTS

GRADUATE STUDENTS:

40 Master's: 20
PhD: 20

FACULTY:

19 5 Licensed PEs
3 Leadership Appointments

STAFF:

11 Research: 7
Administrative: 4

To share alumni stories or updates to be featured in future newsletters, please send them to
Multimedia Specialist Devontae Lindsey at dtl0011@auburn.edu

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Biosystems Engineering