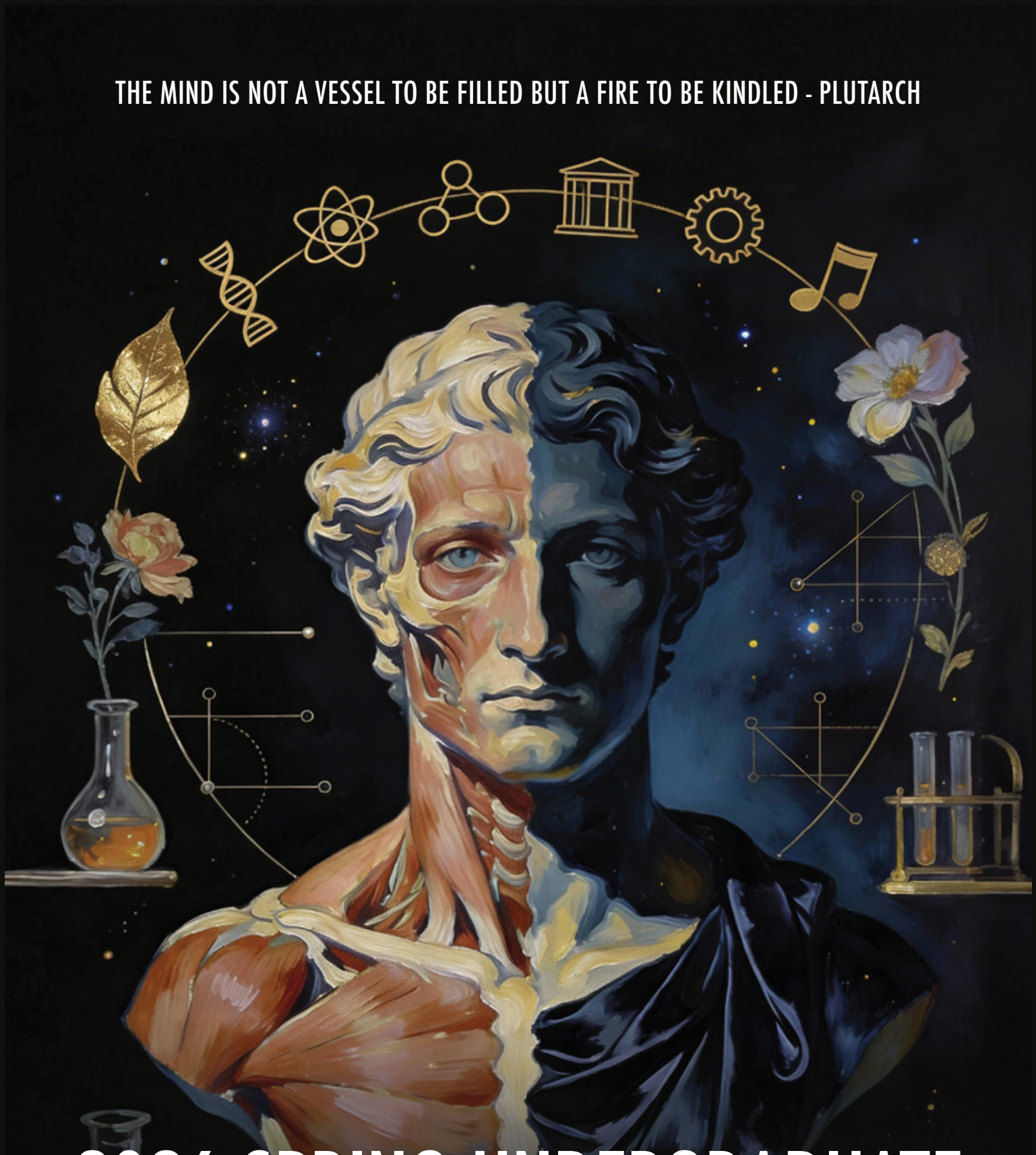
THE MIND IS NOT A VESSEL TO BE FILLED BUT A FIRE TO BE KINDLED - PLUTARCH



2026 SPRING UNDERGRADUATE RESEARCH SYMPOSIUM

Welcome to the 2026 Undergraduate Research Symposium

Presented by:

The Office of Research & Economic Development

The Office of Undergraduate Research & Creative Discovery

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SPRING 2026 RESEARCH CELEBRATION

IGNITING IDEAS, INSPIRING IMPACT

Scan here for more about MSU's Research Celebration!

MISSISSIPPI STATE UNIVERSITY

Office of the Provost and
Executive Vice President
P.O. Box BQ
3500 Lee Hall
Mississippi State, MS 39762

P. 662.325.3742
F. 662.325.4039

Mississippi State University: Our State's Land-Grant Research Flagship

We are honored to welcome you to Mississippi State University's Spring Undergraduate Research Symposium. Undergraduate students are an integral part of the multi-faceted research underway at Mississippi State.

Our faculty, staff, and students are conducting fundamental to applied research that provides innovative advancements, creative works, and new scholarship that address a range of pressing needs. As a result of this work, MSU is the leading institution in our state for research, which is a direct result of our embracing the land- grant mission. Strengths across all colleges and research centers have led to our institution being categorized by the Carnegie Foundation as a "very high research activity" institution. The Carnegie Foundation has also recognized Mississippi State with its Community Engagement Classification.

Pursuing research opportunities is a critical part of academic life on our campus, and our students are recognized for their commitment to discovery, creation, and exploration beyond the classroom. We are pleased that members of our faculty are dedicated to providing undergraduates with meaningful roles in the overall research enterprise and promoting interdisciplinary research as an important component of scholarly activity.

Undergraduate research gives our students opportunities to apply classroom knowledge to new areas of interest and helps them develop skills, collaborate with faculty and peers, and gain confidence. It is exciting to see the results of their efforts on display at today's symposium.

Again, welcome to the symposium, and thank you for your contributions to and interest in research at Mississippi State University.

David R. Shaw, Ph.D.
Provost and Executive Vice President



At Mississippi State, we believe in the transformative potential of university-based research.

We are proud of our undergraduate researchers and the incredible accomplishments on display at today's symposium.

YOUR RESEARCH MATTERS!

We can't wait to see where it takes you.

HAIL STATE!

TAKING CARE OF WHAT MATTERS

Dr. Scott Willard
Interim Vice President
Research and Economic Development

@MaroonResearch

MISSISSIPPI STATE UNIVERSITY™
OFFICE OF RESEARCH AND ECONOMIC DEVELOPMENT

MISSISSIPPI STATE UNIVERSITY™
UNDERGRADUATE RESEARCH
AND CREATIVE DISCOVERY

Welcome to the Spring 2026 Undergraduate Research Symposium

The Office of Undergraduate Research and Creative Discovery is pleased to co-host the Spring Undergraduate Research Symposium and to be a part of Mississippi State University's Research Celebration. This symposium is a great way for undergraduate students to showcase their interest and dedication to research activities and for the MSU family to celebrate their engagement, curiosity, and hard work. Thank you for attending this exhibition!

This event is not possible without the time, effort, and assistance of our dedicated faculty mentors. The student work presented here represents many hours of mentoring students in their research, planning, and analysis. Many faculty and graduate students have also volunteered their time and expertise to serve as evaluators or judges, so thank you to all of them!

This event is an endeavor that relies on the support of countless individuals and sponsorship by many units, including but not limited to The Office of Research and Economic Development, The Graduate School, The Honor Society of Phi Kappa Phi, and Shackouls Honors College. We thank them for their commitment to helping make the Spring Undergraduate Research Symposium a premier event.

We are pleased that fourteen Special Area Competitions are affiliated with the symposium to recognize excellence in scholarship and innovation. We are excited to partner with: Bagley College of Engineering; College of Agriculture and Life Sciences and Mississippi Agricultural and Forestry Experiment Station; College of Arts & Sciences Institute for the Humanities; College of Forest Resources and Forest and Wildlife Research Center; College of Education; Social Science Research Center; Center Data Science Program; Department of Agricultural and Biological Engineering and Department of Comparative Biomedical Sciences; Department of English; Department of Geosciences; Department of Psychology; the Graduate School; Gulf Scholars Program; Theta Tau Professional Engineering Fraternity; and Mitchell Memorial Library.

We are delighted that you have joined us today to honor the accomplishments of our young researchers. We hope you learn much from the diversity of fascinating research activities underway at MSU. Enjoy!

Anastasia D. Elder, Ph.D.
Associate Dean, Shackouls Honors College
Director, Office of Undergraduate Research & Creative Discovery

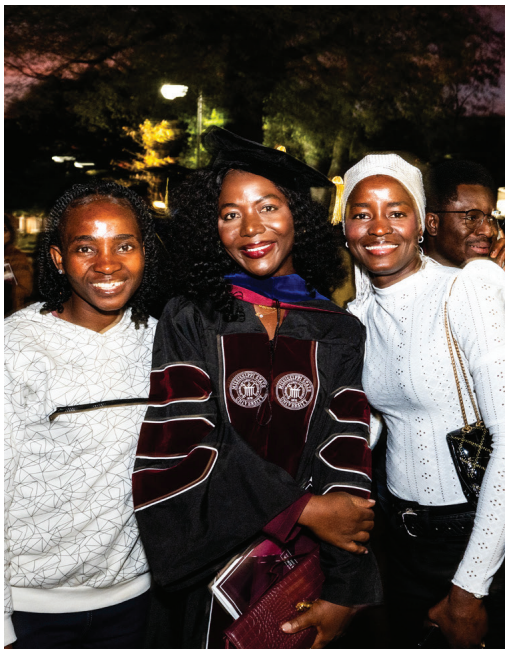
MISSISSIPPI STATE UNIVERSITY™

THE GRADUATE SCHOOL

The MSU Graduate School is proud to host the **Three Minute Research Pitch (3MRP)** as part of the MSU Undergraduate Research Symposium. Showcasing research in this format highlights the creativity, curiosity, and dedication of our undergraduate scholars. Opportunities like the 3MRP encourage students to communicate their ideas clearly, think critically about their work, and share their discoveries with the broader campus community.

We are continually inspired by the passion and innovation our students bring to their research. The Graduate School is proud to support and celebrate all students participating in the Undergraduate Research Symposium and its many events. We wish each participant the very best as they present their work and look forward to seeing the exciting ideas and discoveries they share.







A&S RESEARCH

DISCOVERING WHAT MATTERS

The MSU College of Arts & Sciences is a proud sponsor of the MSU Undergraduate Research Symposium. Engaging in research plays a vital role in the academic culture of our college. Our students are celebrated for their dedication to exploration, innovation, and discovery outside traditional classroom settings. The involvement of undergraduates in research initiatives and advocating for interdisciplinary collaboration is a key aspect of scholarly endeavors.





MISSISSIPPI STATE UNIVERSITY™
COLLEGE OF ARTS & SCIENCES

www.cas.msstate.edu



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JAMES WORTH
BAGLEY
COLLEGE OF ENGINEERING

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Make your impact by conducting groundbreaking research. As a BCoE student, you will work alongside your professors as they look to the future, discovering solutions to the world's most urgent problems. Interested in preventing traumatic brain injuries? Creating autonomous systems? Dream of designing groundbreaking machinery? The college has facilities to conduct a wide variety of design, analysis and testing. It works with a wide variety of MSU centers, such as the Center for Advanced Vehicular Systems (CAVS), the High Performance Computing Collaboratory (HPC^2) and many others.

OVER $66.8 MILLION IN RESEARCH EXPENDITURES (FY24)

FUTURE ENGINEER

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COFER – Center of Family Enterprise Research

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E-Center – Center for Entrepreneurship & Outreach

Turn ideas and research discoveries into real-world startups and innovations.

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COLLEGE OF BUSINESS

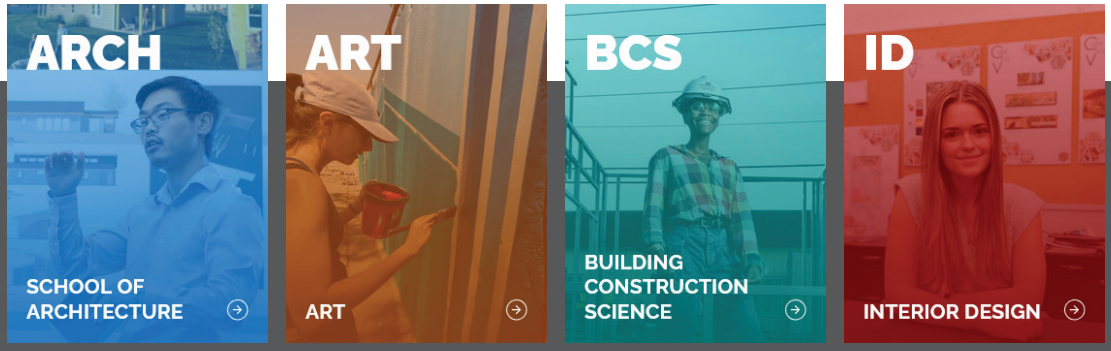
business.msstate.edu



In our four academic units across CAAD, research and creative scholarship are inseparable from the act of making. Our undergraduates help design resilient communities, exhibit original artwork, build with emerging technologies, and shape the spaces where people live and work. Whether through studio practice, fieldwork, or community-engaged design, CAAD students don't just study problems - they design and implement solutions.

Our research centers - the Fred Carl Jr. Small Town Center, the Gulf Coast Community Design Studio, and the Jackson Community Design Center - connect students to real-world challenges in communities across Mississippi and the Gulf South. CAAD undergraduates present at national conferences, compete in juried exhibitions, and contribute to funded research alongside faculty mentors.

Start your research journey at caad.msstate.edu and work with faculty who bring expertise from across the globe.



MISSISSIPPI STATE UNIVERSITY

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

UNDERGRADUATE RESEARCH SCHOLARS PROGRAM





MAKING AN IMPACT

In Mississippi State University's College of Education, we are translating knowledge into impact. In fiscal year 2025 we were awarded $20.8 million for research. We're inspiring others to explore their passions through five academic departments, a division of education, one research unit and numerous service units. Learn more about the centers and institutes housed in our college below and at educ.msstate.edu.

College of Education Faculty Labs

The College of Education's academic units house a number of faculty-led research labs that provide hands-on learning opportunities for students. The labs include human health and performance, academic and behavior intervention, along with artificial intelligence and virtual reality applications in industry and design.

Mississippi Institute on Disabilities

The Mississippi Institute on Disabilities focuses on support and opportunity for people with disabilities in our state. Including MSU's T.K. Martin Center for Technology and Disability, Autism and Developmental Disabilities Clinic and Career Horizons Center, the institute creates a hub for research, training and collaboration.

National Research & Training Center on Blindness & Low Vision

The National Research and Training Center on Blindness and Low Vision is the nation's only federally funded center focused on employment outcomes for people who are blind or have low vision. The center produces field-leading research and provides training to professionals.

Congratulations to our Undergraduate Research Scholars Program participants!






MISSISSIPPI STATE UNIVERSITY
COLLEGE OF FOREST RESOURCES








MISSISSIPPI STATE UNIVERSITY™
COLLEGE OF VETERINARY MEDICINE
vetmed.msstate.edu

THE OFFICE OF PRESTIGIOUS EXTERNAL SCHOLARSHIPS

OFFICE OF PRESTIGIOUS EXTERNAL SCHOLARSHIPS

The Office of Prestigious External Scholarships mentors all Mississippi State University students who apply for national and international scholarships, fellowships, and awards. We work with students to find scholarships that fit their academic and professional aspirations and we help students develop competitive, compelling applications.

Each year, we work with dozens of Mississippi State University students and alumni from a wide variety of backgrounds, areas of study, and interests. We help them to not only develop strong applications to their desired scholarships and fellowships but also to craft strong personal narratives that can be applied beyond external scholarship applications.

Since the office's inception in 2012, Mississippi State has had a Rhodes Scholar, a Churchill Scholar, a Gates Cambridge Scholar, a Marshall Scholar, four Truman Scholars, fourteen Fulbright Scholars, six Boren Scholars, sixteen Astronaut Scholars, eleven PPIA JSI winners, fourteen Goldwater Scholars and more!

UNDERGRADUATE/ NATIONAL

- Astronaut Scholarship
- Goldwater Scholarship
- Udall Undergraduate Scholarship
- Public Policy and International Affairs Junior Summer Institute
- Humanity in Action Fellowship
- Hollings NOAA Scholarship

INTERNATIONAL

- Fulbright U.S. Student Awards
- Fulbright U.K. Summer Institute
- Boren Awards
- Critical Language Scholarship
- DAAD - Rise
- Voyager Scholarship

GRADUATE SCHOOL

- Knight-Hennessy Scholar Program
- Truman Scholarship
- Rhodes Scholarship
- Gates-Cambridge Scholarship
- Marshall Scholarship
- Mitchell Scholarship
- Churchill Scholarship
- Rangel Fellowship

ARE YOU INTERESTED IN APPLYING TO AN EXTERNAL SCHOLARSHIP? SCHEDULE A MEETING!

For appointments regarding specific scholarships, application processes, or editing of polished essays, please contact Dr. David Hoffman, Director of OPES.

THE HONOR SOCIETY OF

PHI KAPPA PHI

Chapter 060
Mississippi State University
Mississippi State, MS 39762

RE: The Undergraduate Research Symposium – Spring 2026

Dear Undergraduate Research Symposium Participants:

The Honor Society of Phi Kappa Phi (PKP) has a long and distinguished history. Currently, there are over 300 chapters of PKP scattered all across the world, from Maine to Hawaii and the Philippines, and from Alaska to Puerto Rico and beyond. During the 1996 – 97 academic year, PKP celebrated the 100th anniversary of the founding of The Honor Society of Phi Kappa Phi, and we are now in the second century of its recognition of- and service to - learning. The MSU chapter celebrated its 70th year of membership in 2021 and consists of 770 active members at present. PKP invites only the highest achieving students from across all disciplines to join this prestigious society and induct new members each spring and fall into the Honor Society. Due to PKP's prestigious recognition and support of learning, the MSU Chapter is proud to support the Spring 2026 Undergraduate Research Symposium at Mississippi State University. As Chapter President, I am honored that Phi Kappa Phi has been asked and is able to support this event as I have tremendous respect for undergraduate research at MSU. This symposium displays the importance of research for success as a student and beyond! Undergraduate research meets a very important criteria of ensuring that every student engages in some form of experiential learning while attending the university.

Thank you for all you do to support undergraduate research opportunities at Mississippi State University,

Respectfully,

Joshua Granger

Joshua Granger, PhD, MSU PKP Chapter President

Josh Granger
President
P.O. Box 9681
MS State, MS
39762

Krishna Poudel
Vice President
P.O. Box 9681
MS State, MS
39762

-

Student Vice Presidents:
Caitlyn Guthrie

Patty Ann Bogue
Secretary
P.O. Box 9581
MS State, MS
39762

Melanie Loehwing
Treasurer
P.O. Box 9706
MS State, MS
39762

Angela Hill
Administrative
Secretary

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P.O. Box 9690
MS State, MS
39762

662-325-3830
Fax: 662-325-4763
http://pkp.msstate.edu
pkp@org.msstate.edu

Congratulations,
and thank you for making
the Spring 2026
Undergraduate Research
Symposium a success!

WE ARE SO PROUD OF YOU!

MISSISSIPPI STATE UNIVERSITY™
JUDY AND BOBBY SHACKOULS
HONORS COLLEGE

MISSISSIPPI STATE UNIVERSITY™
OFFICE OF RESEARCH DEVELOPMENT

PROPOSAL SUPPORT

& MORE THAN PROPOSAL SUPPORT

The Office of Research Development is a service for all MSU faculty and staff, but when possible, first utilize the resources provided by your department and/or college. All proposal submissions are subject to review and approval by submitter's department, college, and OSP, regardless of ORD involvement.



Support is available by request and is based on both deadlines and the capacity of the ORD staff. Requests for assistance within one week of a proposal's OSP deadline will be considered on an individual basis.

PROGRAMS, RESOURCES, FINDING FUNDING, LIMITED SUBMISSIONS, CONSULTATIONS

A LITTLE TIME?

If you have 2-4 weeks before the deadline, ORD can still help you with 1-2 of the following components:

- *Editorial Review of narrative*
- *Critical Review of narrative*
- *Limited review* of all components
- *Budget Review*
- *Assistance with uploading into Cayuse*

A LOT OF TIME?

If you have 4-8 weeks before the deadline, ORD can provide more in-depth services, such as:

- *RFP Analysis & Proposal Preparation assistance*
- *Provision of examples & templates*
- *Assistance with research compliance*
- *Team building & Oversight*
- *Editorial & Critical Reviews of all components*
- *Assistance with Submission*

Request assistance at
development@ord.msstate.edu

Wednesday, April 8th

Session 1 - Engineering and Physical Science		
Time	*Event*	*Location*
9:00 a.m. - 9:30 a.m.	Student and Evaluator Check-In Student Viewing of Other Posters	Foster Ballroom, 2nd Floor, Colvard Union
9:30 a.m. - 9:45 a.m.	Opening Remarks - Dr. Scott Willard, Interim Vice President for Research and Economic Development, Dean - College of Agriculture and Life Sciences, Director - Mississippi Agricultural and Forestry Experiment Station	Foster Ballroom, 2nd Floor, Colvard Union
9:45 a.m. - 11:30 a.m.	Poster Evaluation Period	Foster Ballroom, 2nd Floor, Colvard Union

Session 2a - Arts, Design, Business & Economics, Education, Humanities, Music & Social Science (Posters)		
Time	*Event*	*Location*
1:30 p.m. - 2:00 p.m.	Student & Evaluator Check-In Student Viewing of Other Posters	Foster Ballroom, 2nd Floor, Colvard Union
2:00 p.m. - 2:15 p.m.	Opening Remarks - Dr. Rick Travis, Dean, College of Arts and Sciences	Foster Ballroom, 2nd Floor, Colvard Union
2:15 p.m. - 4:00 p.m.	Poster Evaluation Period	Foster Ballroom, 2nd Floor, Colvard Union

Session 2b - Arts, Design, Business & Economics, Education, Humanities, Music & Social Science (Oral Presentations)		
Time	*Event*	*Location*
12:30 p.m. - 1:00 p.m.	Student & Evaluator Check-In	Fowlkes Auditorium, 3rd Floor, Colvard Union
1:00 p.m. – 2:30 p.m.	Group 1 Presentations - *See separate event schedule*	Fowlkes Auditorium, 3rd Floor, Colvard Union
2:30 p.m. – 5:00 p.m.	Group 2 Presentations - *See separate event schedule*	Fowlkes Auditorium, 3rd Floor, Colvard Union

Thursday, April 9th

Session 3 - Biological & Life Sciences		
Time	*Event*	*Location*
9:00 a.m. - 9:30 a.m.	Student & Evaluator Check-In Student Viewing of Other Posters	Foster Ballroom, 2nd Floor, Colvard Union
9:30 a.m. - 9:45 a.m.	Opening Remarks - Dr. Mark E. Keenum, President, Mississippi State University	Foster Ballroom, 2nd Floor, Colvard Union
9:45 a.m. - 11:30 a.m.	Poster Evaluation Period	Foster Ballroom, 2nd Floor, Colvard Union

Session 4 - 3Minute Research Pitch		
Time	*Event*	*Location*
1:00 p.m. - 4:00 p.m.	3-Minute Research Pitch Competition, Hosted by The Graduate School - *see separate event schedule*	The Dawghouse, 1st Floor, Colvard Union

Wednesday, April 8th

Oral Presentation Detailed Schedule

All Oral Presentations will take place in Fowlkes Auditorium, Colvard Union, 3rd Floor

**Presenters should check in a minimum of 15 minutes prior to their assigned time*

Session 2b - Arts, Design, Business & Economics, Education, Humanities, Music & Social Science (Oral Presentations)	
Group 1: Arts, Music & Design	
1:00 p.m. – 1:15 p.m.	Piper Bratton *(#089)* BaySide: Microcity in East Biloxi
1:15 p.m. – 1:30 p.m.	Dan Swanson *(#094)* Life, Reframed: How *Man with a Movie Camera* Crafts Reality from the Cutting Room Floor
1:30 p.m. – 1:45 p.m.	Gabriella Sutherland *(#093)* Superminds Solidified: A Community Apothecary Project to Address Collective Health Intelligence in Mississippi
1:45 p.m. – 2:00 p.m.	Tess Higginbotham *(#091)* Drawing as Pedagogy in Architectural History
2:00 p.m. – 2:15 p.m.	Miles Williams *(#097)* The Market Value of Mass Timber: Comparative Leasing and Occupancy Performance of Mass Timber and Conventional Class A Office Buildings
2:15 p.m. – 2:30 p.m.	Julia Schloemer *(#092)* The Zurna: Its History, Significance, and the Piece it Inspired
Group 2: Humanities	
2:30 p.m. – 2:45 p.m.	Bradley Burke *(#115)* Swineherds and Centrality: How Eumaeus Relates to Odysseus
2:45 p.m. – 3:00 p.m.	Elijah Roark *(#119)* “I’m becoming... confused again, aren’t I?”: Queer Repression and Monstrous Motherhood in the *Psycho* Franchise
3:00 p.m. – 3:15 p.m.	Madelynn Green *(#116)* Tricky Tales: Comparing Samson & Odysseus in Greek Narratives
3:15 p.m. – 3:30 p.m.	Bradley Tedford *(#124)* A “State-Sanctioned Amnesia”: How History Shaped and Stunted Mississippi’s Curriculum
3:30 p.m. – 3:45 p.m.	Alexandra Williams *(#125)* From Chatter to Charter: How Eleanor Roosevelt Used Her Position as A Magazine Columnist to Promote Global Cooperation to the American Public
3:45 p.m. – 4:00 p.m.	Lauren Rounds *(#120)* The Beast Born of Beauty: A Study of Humanness through Beauty within *Frankenstein*
4:00 p.m. – 4:15 p.m.	Samuel Spitzer *(#123)* Fair and Balanced, Question More: A Comparative Analysis of Fox News and RT
4:15 p.m. – 4:30 p.m.	Bethany Higgason *(#117)* The World According to Ethan Edwards: Ideology and Threshold in John Ford's *The Searchers*
4:30 p.m. – 4:45 p.m.	Jakeria Shaw *(#122)* Possible Solutions to The Gambia's Saltwater Encroachment Crisis: A Literature Review

MISSISSIPPI STATE UNIVERSITY™
THE GRADUATE SCHOOL

3 Minute Research Pitch Competition

Hosted by The Graduate School

Thursday, April 9th, 1:00 p.m. - 4:00 p.m.

A detailed schedule will be available at the event

The Dawghouse, Colvard Union, First Floor

About the competition...

This competition is modeled after the Three Minute Thesis (3MT) program, which started fifteen years ago at the Queensland University in Australia as a means of encouraging graduate students to learn how to articulate their research in a 3-minute presentation using one slide and in a vernacular that any individual not in the field of study would walk away with a comprehension and understanding of the field of study being undertaken. This is now a global event with graduate students participating at annual regional, national, and international events.



DAY ONE | 9:30AM – 11:30AM

ENGINEERING		
Alexis **Allen**	**001**	*Mechanical Engineering*
Andrea **Ambrose**	**002**	*Software Engineering*
Prashant **Bhattari**	**003**	*Mechanical Engineering*
Cooper **Black**	**004**	*Software Engineering*
Andrew **Buchanan**	**005**	*Mechanical Engineering*
Prabin **Budhathoki**	**006**	*Computer Engineering*
Ella **Burcham**	**007**	*Biomedical Engineering*
Haley **Carpenter**	**008**	*Biomedical Engineering*
Piyush **Chaudhary**	**009**	*Mathematics*
Devin **Chen**	**010**	*Cybersecurity*
Hunter **Chunn**	**011**	*Chemical Engineering*
Eli **Coleman**	**012**	*Aerospace Engineering*
Steven **Coltharp**	**013**	*Aerospace Engineering*
Emma **Cook**	**014**	*Chemical Engineering*
Edward **Cruz**	**015**	*Computer Science*
Ethan **Dean**	**016**	*Sustainable Bioproducts*
Joseph **Dooley**	**017**	*Industrial Engineering*
Lauren **Edwards**	**018**	*Biomedical Engineering*
Eghonghon **Eigbe**	**019**	*Civil Engineering*
Zachary **Emmons**	**020**	*Mechanical Engineering*
Kofi **Ennin**	**021**	*Computer Science*
Temitope **Fasola**	**022**	*Aerospace Engineering*
Peyton **Fox**	**023**	*Biomedical Engineering*
Charles **Fulford**	**024**	*Biomedical Engineering*
William **Garrison**	**025**	*Computer Science*
Jordan **Gillespie**	**026**	*Mechanical Engineering*
Jillian **Gillum**	**027**	*Computer Science*
Niranjan **Giri**	**028**	*Computer Engineering*
Amanda **Guiterrez**	**029**	*Aerospace Engineering*
Jayla **Henry**	**030**	*Computer Science*
Hannah **Henson**	**031**	*Microbiology*
Austin **Hoff**	**032**	*Aerospace Engineering*
Luca **Hoffman**	**033**	*Computer Engineering*
Martina **Hoffman**	**034**	*Computer Engineering*
Kyla **Hunter**	**035**	*Industrial Engineering*
Luke **Jordan**	**036**	*Aerospace Engineering*
Saugat **Karki**	**037**	*Computer Engineering*
Joshua **Kelley**	**038**	*Computer Science*
Christian **Kingdom**	**039**	*Information Technology Services*

Anabelle **Lawson**	**040**	*Industrial Engineering*
Emme **Levy**	**041**	*Biomedical Engineering*
Emma **Lovell**	**042**	*Biomedical Engineering*
Brijes **Mandal**	**043**	*Computer Engineering*
Kyla **Mangum**	**044**	*Computer Science*
Nicole **Milla**	**045**	*Computer Science*
Anoop **Mishra**	**046**	*Computer Science*
Abdulrehman **Mohamed**	**047**	*Mechanical Engineering*
Alaa **Mohammad**	**048**	*Computer Engineering*
Jacob **Odom**	**049**	*Chemical Engineering*
Jay **Patel**	**050**	*Aerospace Engineering*
Pranavi **Paudel**	**051**	*Mechanical Engineering*
Robert **Phillipe**	**052**	*Chemical Engineering*
Isabel **Pielich**	**053**	*Biomedical Engineering*
Kayla **Pigott**	**054**	*Industrial Engineering*
Christopher **Powell**	**055**	*Mechanical Engineering*
Gabriella **Price**	**056**	*Mechanical Engineering*
Jazmaree **Rich**	**057**	*Computer Science*
Garrett **Riggs**	**058**	*Mechanical Engineering*
Carter **Scaggs**	**059**	*Data Science*
Jonathan **Shelton**	**060**	*Mechanical Engineering*
Marin **Sherwin**	**061**	*Mechanical Engineering*
Summer **Simmons**	**062**	*Biomedical Engineering*
Callie **Simon**	**063**	*Computer Science*
Adi **Singh**	**064**	*Computer Science*
Andrew **Sisco**	**065**	*Mechanical Engineering*
Ryan Cole **Stafford**	**066**	*Mechanical Engineering*
Lonnie **Tankersley**	**067**	*Aerospace Engineering*
Lonnie **Tankersley**	**068**	*Aerospace Engineering*
Jayla **Travis**	**069**	*Software Engineering*
Saphal **Upreti**	**070**	*Computer Engineering*
Nora **Walker**	**071**	*Agribusiness*
Joseph **Watkins**	**072**	*Mechanical Engineering*
Samuel **Watson**	**073**	*Biomedical Engineering*
Kellie **Watts**	**074**	*Data Science*
Emalee **West**	**075**	*Chemical Engineering*
India **White**	**076**	*Biomedical Engineering*
Blake **Williams**	**077**	*Industrial Engineering*
Jacob **Wilson**	**078**	*Computer Science*
Toni **Woodberry**	**079**	*Computer Engineering*

PHYSICAL SCIENCES		
Swarup **Bhattarai**	**080**	*Physics*
Michelle **Brown**	**081**	*Chemical Engineering*
Christopher **Chen**	**082**	*Chemistry*
Elaine **Ross**	**083**	*Geoscience*
Gabriel **Slade**	**084**	*Geoscience*
Brody **Taylor**	**085**	*Data Science*
Luke **Wilkins**	**086**	*Biological Sciences*

DAY ONE | 2:00PM – 4:00PM

ARTS, MUSIC & DESIGN		
Jo **Aguilar**	**087**	*Architecture*
Rachel **Bowers**	**088**	*Landscape Architecture*
Piper **Bratton**	**089**	*Landscape Architecture*
Emily **Davis**	**090**	*Architecture*
Tess **Higginbotham**	**091**	*Architecture*
Julia **Schloemer**	**092**	*Music Education*
Gabriella **Sutherland**	**093**	*Interior Design*
Dan **Swanson**	**094**	*Communication*
Rachel **Thaggard**	**095**	*Communication*
Kailey **Walker**	**096**	*Interior Design*
Miles **Williams**	**097**	*Architecture*

BUSINESS AND ECONOMICS		
Ava **Feyerherm**	**098**	*Business Administration*
Kaitlyn **Greenwood**	**099**	*Business Administration*
Jonathan **Kiesel**	**100**	*Mathematics*
Sreesh **Manayakar**	**101**	*Economics*
Drew **Rogers**	**102**	*Agribusiness*
Taylor **Sullivan**	**103**	*Marketing*

EDUCATION		
Nathaniel **Afirim**	**104**	*Kinesiology*
Kitashu **Bhagat**	**105**	*Physics*
Cristopher **Cordova**	**106**	*Kinesiology*
Johanna **Hilbun**	**107**	*Kinesiology*
O'Brien **Lee**	**108**	*Biochemistry*
Matthew **Mansell**	**109**	*Biochemistry*
Emma **McDonald**	**110**	*Kinesiology*
Benjamin **Orr**	**111**	*Kinesiology*

Breaunna **Ruffin**	**112**	*Kinesiology*
Everett **Stringer**	**113**	*Kinesiology*
Jalynn **Wynn**	**114**	*Learn & User Experience Design*

HUMANITIES		
Bradley **Burke**	**115**	*Secondary Education*
Madelynn **Green**	**116**	*Anthropology*
Bethany **Higgason**	**117**	*English*
Madeline **Lee**	**118**	*Liberal Arts*
Elijah **Roark**	**119**	*Communication*
Lauren **Rounds**	**120**	*English*
Noah **Saben**	**121**	*History*
Jakeria **Shaw**	**122**	*Business Economics*
Samuel **Spitzer**	**123**	*Accounting*
Bradley **Tedford**	**124**	*History*
Alexandra **Williams**	**125**	*Political Science*

SOCIAL SCIENCES		
Judd **Albans**	**126**	*Business Administration*
McKenzie **Armstrong**	**127**	*Psychology*
Sydney **Baker**	**128**	*Ag. Education, Leadership & Communication*
Abby **Berger**	**129**	*Biochemistry*
Gabrielle **Bridges**	**130**	*Fashion Design & Merchandising*
Jason **Connolly**	**131**	*Psychology*
Brianna **Cox**	**132**	*Psychology*
Elijah **Dallager**	**133**	*Communication*
Sophia Irene **Doyle**	**134**	*Agribusiness*
Elizabeth **Emanuel**	**135**	*Psychology*
Emily **Evans**	**136**	*Human Development & Family Science*
Regan **Felder**	**137**	*Psychology*
Katie **Garcia**	**138**	*Fashion Design & Merchandising*
Isabella **Garrard**	**139**	*Data Science*
Nina **Gault**	**140**	*Communication*
Fatima **Gonzalez**	**141**	*Psychology*
Gwendalyn **Hamilton**	**142**	*Psychology*
Lauren **Hamilton**	**143**	*Psychology*
Cayley **Harrell**	**144**	*Psychology*
Grant **Holladay**	**145**	*Foreign Language*
Chelsey **Hollinger**	**146**	*Microbiology*
Regan **Hupe**	**147**	*Human Development & Family Science*
Meri **Jackson**	**148**	*Business Administration*
Christopher **Jolivette**	**149**	*Psychology*

Margaret **Keith**	**150**	*Communication, Media & Theater*
Leonard **Knight**	**151**	*Psychology*
Joanna Grace **Lambert**	**152**	*Psychology*
Devyn **Lee**	**153**	*Fashion Design & Merchandising*
Matthew **Lentz**	**154**	*Geoscience*
Manning **Littlejohn**	**155**	*Data Science*
Shelby **Luquet**	**156**	*Communication*
Mari Alis **Lyons**	**157**	*Human Development & Family Science*
Anna **Mattox**	**158**	*Communication*
Jurdan **May**	**159**	*Psychology*
Bennett **McCluskey**	**160**	*Psychology*
Juliana **Medeiros**	**161**	*Psychology*
Henry **Miller**	**162**	*Psychology*
Emma **Morgan**	**163**	*Biological Sciences*
Sarah **Morgan**	**164**	*Fashion Design & Merchandising*
Molley **Morris**	**165**	*Clinical Laboratory Sciences*
Morgan **Neal**	**166**	*Educational Psychology*
River **Neri**	**167**	*Communication*
Briyonna **Newsom**	**168**	*Microbiology*
Elizabeth **Nichols**	**169**	*Psychology*
Nala **Pace**	**170**	*Psychology*
Alice **Phouasalith**	**171**	*Psychology*
Madison **Pree**	**172**	*Human Development & Family Science*
Kyle **Reasons**	**173**	*Supply Chain Logistics*
Madeline **Rossi**	**174**	*Psychology*
Olivia **Sanders**	**175**	*Psychology*
Amaya **Savage**	**176**	*Psychology*
Anna **Sceroler**	**177**	*Human Development & Family Science*
Mason **Seymour**	**178**	*Psychology*
Adi **Singh**	**179**	*Computer Science*
Ryland **Smallen**	**180**	*Ag. Education, Leadership & Communication*
Emily **Snodgrass**	**181**	*Biochemistry*
Gabriella **Sutherland**	**182**	*Psychology*
Abbey **Sweeney**	**183**	*Psychology*
Carson **Temple**	**184**	*Biological Sciences*
Jenesis **Vann**	**185**	*Psychology*
Hailey **Witt**	**186**	*Psychology*
Anna-Claire **Wright**	**187**	*Educational Psychology*
Kallen **Zhou**	**188**	*Economics*

DAY TWO | 9:30AM – 11:30AM

BIOLOGICAL AND LIFE SCIENCES		
Jena **Ahn**	**189**	*Biochemistry*
Hayden **Anderson**	**190**	*Biochemistry*
Dilber **Annageldiyeva**	**191**	*Biochemistry*
Hunter **Appleton**	**192**	*Biochemistry*
Avery **Ardoin**	**193**	*Biomedical Engineering*
Natalie **Barksdale**	**194**	*Wildlife, Fisheries & Aquaculture*
Skylar **Bates**	**195**	*Landscape Architecture*
Allison **Beard**	**196**	*Wildlife, Fisheries & Aquaculture*
Kylie **Birchfield**	**197**	*Forestry*
Rebecca **Blackstock**	**198**	*Biochemistry*
Maxwell **Bloodworth**	**199**	*Agronomy*
Ella Kate **Boothe**	**200**	*Biochemistry*
Allie **Bordeaux**	**201**	*Biochemistry*
Taylor **Brown**	**202**	*Forestry*
Sadie **Bryan**	**203**	*Biochemistry*
Martin **Buck**	**204**	*Biochemistry*
Maggie **Burnett**	**205**	*Biochemistry*
Kamry **Camp**	**206**	*Animal and Dairy Science*
Alana **Caudill**	**207**	*Landscape Architecture*
Benjamin **Chaffins**	**208**	*Wildlife, Fisheries & Aquaculture*
Caroline **Chapman**	**209**	*Animal and Dairy Science*
Kelsey **Clay**	**210**	*Biological Sciences*
Alexa **Cooper**	**211**	*Data Science*
Elizabeth **Crowe**	**212**	*Kinesiology*
Dennis **Dalton**	**213**	*Forestry*
Jeremy **Dawe**	**214**	*Data Science*
Mike **DeBona**	**215**	*Wildlife, Fisheries & Aquaculture*
Natalia **Diego**	**216**	*Animal and Dairy Science*
Maggie **Dillahunty**	**217**	*Animal and Dairy Science*
QuoJosalyn **Duck**	**218**	*Biochemistry*
Quinn **Durfey**	**219**	*Horticulture*
Reagan **Elmore**	**220**	*Biochemistry*
Peytan **Evans**	**221**	*Biochemistry*
Haley **Ferrell**	**222**	*Animal and Dairy Science*
Kinsey **Fikes**	**223**	*Environmental Economics & Sustainability*
Chase **Frye**	**224**	*Agricultural Science*
Marcos **Galvan**	**225**	*Animal and Dairy Science*
Bailee **Gean**	**226**	*Wildlife, Fisheries & Aquaculture*
Kyra **Goetsch**	**227**	*Biochemistry*

Blanca **Gomez**	**228**	*Animal and Dairy Science*
Madeline **Grantham**	**229**	*Forestry*
Victoria **Greene**	**230**	*Wildlife, Fisheries & Aquaculture*
April **Guo-Yue**	**231**	*Biomedical Engineering*
Emma **Haines**	**232**	*Wildlife, Fisheries & Aquaculture*
Ethan **Hall**	**233**	*Biochemistry*
Samantha **Hallett**	**234**	*Wildlife, Fisheries & Aquaculture*
Parker **Hansen**	**235**	*Natural Resources & Env. Conservation*
Malena **Heck**	**236**	*Animal and Dairy Science*
Amelia **Horner**	**237**	*Wildlife, Fisheries & Aquaculture*
Adrian **Horstead**	**238**	*Wildlife, Fisheries & Aquaculture*
Cadence **Jackson**	**239**	*Animal and Dairy Science*
Arabella **Jarvais**	**240**	*Animal and Dairy Science*
Taylor **Johnson**	**241**	*Biochemistry*
Emma **Jorden**	**242**	*Animal and Dairy Science*
Hunter **Kava**	**243**	*Agricultural Science*
Macy **Keeton-Reddix**	**244**	*Poultry Science*
Payton **Kelly-Van Domelen**	**245**	*Biomedical Engineering*
Emma Grace **Koger**	**246**	*Ag. Engineering, Technology, and Business*
Riley **Laird**	**247**	*Microbiology*
Mallory **Lewis**	**248**	*Agronomy*
Spencer **Lile**	**249**	*Biomedical Engineering*
Natalie **Lovell**	**250**	*Biochemistry*
Colleen **Luttrell**	**251**	*Wildlife, Fisheries & Aquaculture*
Michelle **Martinez**	**252**	*Animal and Dairy Science*
Avery **McDaniel**	**253**	*Biochemistry*
Jacob **McGee**	**254**	*Wildlife, Fisheries & Aquaculture*
Keaura **Mearday**	**255**	*Animal and Dairy Science*
Mary Virginia **Miller**	**256**	*Microbiology*
Portia **Mobley**	**257**	*Biological Sciences*
Molly **Montoya**	**258**	*Biochemistry*
Ameslee **Moore**	**259**	*Biomedical Engineering*
Tucker **Morris**	**260**	*Biochemistry*
Ariana **Neal**	**261**	*Ag. Education, Leadership & Communication*
Caroline **Nelson**	**262**	*Biochemistry*
Josiah **Noruk**	**263**	*Biochemistry*
David **Nwaokolo**	**264**	*Biochemistry*
Elizabeth **Orton**	**265**	*Biochemical Engineering*
Erica **Parker**	**266**	*Animal and Dairy Science*
Landon **Parrow**	**267**	*Biochemistry*
Whitney **Prince**	**268**	*Wildlife, Fisheries & Aquaculture*
Dru **Prisock**	**269**	*Animal and Dairy Science*

Sarah **Raborn**	**270**	*Sustainable Bioproducts*
Daniel **Rawlinson**	**271**	*Biochemistry*
Madeline **Raynor**	**272**	*Chemical Engineering*
Mackenzie **Reese**	**273**	*Animal and Dairy Science*
Nathan **Reeves**	**274**	*Wildlife, Fisheries & Aquaculture*
Lillie **Reid**	**275**	*Animal and Dairy Science*
Jessica **Rutherford**	**276**	*Chemical Engineering*
Isabella **Shelton**	**277**	*Biochemistry*
Patton **Simbeck**	**278**	*Ag. Engineering, Technology, and Business*
Chloe **Skelton**	**279**	*Animal and Dairy Science*
Wilson **Small**	**280**	*Animal and Dairy Science*
Carson **Smith**	**281**	*Wildlife, Fisheries & Aquaculture*
Emmalee **Sneed**	**282**	*Microbiology*
Emma **Spinks**	**283**	*Biochemistry*
Emma **Squires**	**284**	*Forestry*
J. Lake **Stanley**	**285**	*Animal and Dairy Science*
Rachel **Stoner**	**286**	*Biochemistry*
Morgan **Taylor**	**287**	*Biochemistry*
Samantha **Thoman**	**288**	*Biochemistry*
Ellianna **Uldrich**	**289**	*Biological Sciences*
Sophie **Van Herik**	**290**	*Biochemistry*
Vineel **Vanga**	**291**	*Biochemistry*
Kaylynn **Walker**	**292**	*Animal and Dairy Science*
Makayla **Walker**	**293**	*Biochemistry*
Kassie **Watts**	**294**	*Animal and Dairy Science*
Courtney **Webber**	**295**	*Wildlife, Fisheries & Aquaculture*
Rilee **Welliver**	**296**	*Wildlife, Fisheries & Aquaculture*
Allie **Wilburn**	**297**	*Wildlife, Fisheries & Aquaculture*
Candice **Williams**	**298**	*Fashion Design & Merchandising*
Chiara **Williams**	**299**	*Agronomy*
Kari **Wise**	**300**	*Wildlife, Fisheries & Aquaculture*



#104 - Afirim, Nathaniel

Major: Kinesiology - Bachelor of Science
Faculty Research Mentor: Guillermo Oviedo, Department of Kinesiology
Co-Author(s): Kya Davis, Vikaas Manjunath, Ben Orr, Cristopher Cordova
Funding: None | **Project Category:** Education

Body composition and carotid intima-media thickness in rural young adults: is there a relationship?

Background: Cardiovascular disease (CVD) is currently the leading cause of death in the United States of America. A higher body fat percentage and the intima–media thickness of the common carotid artery (cIMT) are markers related to an increased risk of CVD. There is a gap in the knowledge about these markers among young adults from rural areas. In our study, we aimed to analyze differences in body composition and cIMT between males and females, and to assess possible correlations among these variables. Methods: We recruited 13 participants (7 females and 6 males; age = 24.5 ± 4.46 years old). Height was measured using a stadiometer. Weight, fat mass, and fat-free mass were measured using bioimpedance analysis (Tanita MC-780U, IL, USA). cIMT was measured with a 12L-RS linear array probe, and ultrasound equipment (Vivid iq Ultra Edition, GE, USA). Non-parametric tests were used to analyze differences between males and females, and the Spearman rho test to assess possible correlation between variables. Results: Females on average had a higher body fat percentage than their male counterparts ($p=0.027$). In terms of muscle mass and fat-free mass, males also had higher values in relation to females ($p=0.012$). cIMT averages in males (0.47 ± 0.06 mm) and females (0.51 ± 0.06 mm) were not statistically different. There were no significant correlations between cIMT and body composition parameters in this sample of rural young adults. Conclusion: The results of this study show that there were differences in body composition between males and females. The values of the cIMT obtained for this group of young adults fall within the healthy range for both genders. Interestingly, body composition was not related to cIMT. Future research should increase the sample size of participants to validate the results of this study.

#087 - Aguilar, Jo

Major: Architecture - Bachelor of Architecture
Faculty Research Mentor: Alexis Gregory, School of Architecture
Funding: None **Project Category:** Arts, Music, & Design

Of the Senses: Architecture and Accessibility

The current understanding and application of accessibility standards within architectural design studios are defined by an individual's mobile feasibility on site, outlined by numeric specifications required by the International Building Code (IBC) and the Americans with Disabilities Act (ADA), and provide a loose framework to develop a project that can be experienced holistically. The purpose of this study is to analyze what language students and staff use when discussing their projects and code regulations. I hypothesize that the current approach to accessible design reinforces an ocular-centric paradigm for discussing architecture that places visual descriptions and forms of representations over other sensory forms of exploration, resulting in the limitation of accessible design to mobile feasibility.
This study facilitated one-on-one semi-structured interviews with the researcher focusing on personal design choices made within projects, focus group semi-structured interviews between 2-3 students from different studios with different project types and across year levels discussing the application of the International Building Code regulations and the American's with Disabilities Act within their projects, and one-on-one critiques with architectural faculty and a student to gauge language used in an educational setting.

#189 - Ahn, Jena

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Juan Silva, Biochemistry Nutrition Health Promo
Co-Author(s): Angelica Abdallah Ruiz
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Are microbial indicators good in predicting cheddar cheese discoloration?

Cheese quality is influenced by multiple factors, including the quality of raw milk, environmental conditions, and processing practices. When optimal conditions are not maintained, an undesirable microbial profile may develop in the final product. The objective of this study was to identify and compare the microbial composition of good vs poor quality (based on sensory/appearance: off-flavors and discoloration) aged cheddar cheese. Samples were collected from 20-lb blocks of aged cheddar cheese stored (aged) for either four or seven months. Two-pound subsamples were taken from each block, from both visually and sensorially acceptable areas, and from areas with pink discoloration and sour taste. Each sample was teste for microbial flora and subsamples were also taken for microbiome analysis. Cheese samples were tested for Aw, pH, aerobic plate counts (APC), psychrotrophic counts (PPC), lactic acid bacteria (LAB), total coliforms (TCC), generic *Escherichia coli (EC)*, and yeast and mold (YMC) counts. There appears to be no difference in pH or Aw between treatments. Pour-quality cheese was only found after 7 months of aging. These samples had lower APC (5.8 log CFU/g) and PPC (6.5 log CFU/g) and slightly higher LAB than acceptable quality cheese (APC: 6.7-7.2; PPC: 6.7-7.1 log CFU/g). In addition, TCC and EC were below detection levels (<1 log CFU/g) for all groups, indicating no evidence of fecal contamination. Surface part of the cheese tended to have slightly higher APC/PPC and mold counts than the inside/core portions, in both groups of cheeses. This may reflect oxygen gradients or wax interactions. In general, quality defects are not driven by elevated APC/PPC counts; instead, they may relate to community composition or metabolic by-products. LAB could be relevant to off-flavor development, but microbiome studies could give more insight into LAB species responsible for this problem.

#126 - Albans, Judd

Major: Business Administration - Bachelor of Business Adm
Faculty Research Mentor: Neil Deochand, CounselHEdEdPsyFound (CHEF)
Co-Author(s): Stephanie Mattson, Judd Albans, Tyner Albans, Alaina Weeks, Wei Zhenhuan
Funding: None | **Project Category:** Social Sciences

Seeing Plaque, Changing Care: A Systematic Review of Plaque Disclosing Agents

Effective oral hygiene relies on proper toothbrushing, including sufficient time spent on inner, outer, and occlusal surfaces of each quadrant. Brushing technique affects plaque accumulation but assessing it can be challenging. Plaque disclosing agents stain tooth surfaces to reveal plaque invisible to the naked eye, providing individualized feedback that guides brushing and improves self-monitoring. While these agents significantly improve plaque removal and long-term oral hygiene, few studies have examined their role in behavior change. We conducted a systematic review of studies using disclosing agents, categorizing them as part of training programs or as outcome measures. Our findings show limited research targeting high-risk populations, such as children with intellectual, emotional, or developmental disabilities, who could benefit most from individualized feedback. As an accessible, low-cost tool, disclosing agents offer immediate feedback, enhancing oral health awareness and supporting effective self-care. Their integration into daily routines or professional instruction can improve preventive care and reduce caries and periodontal disease risk. **Background:** Effective plaque removal is essential for preventing caries and periodontal disease, yet many individuals miss areas during routine brushing. Disclosing agents provide immediate visual feedback by staining biofilm. **Objective:** To highlight the role of plaque disclosing agents in patient education and daily oral hygiene to improve plaque detection and brushing effectiveness. **Methods:** This review synthesizes clinical studies evaluating disclosing agents as behavioral and educational tools for plaque control. **Results:** Visual plaque disclosure enhances awareness of plaque-prone areas and improves brushing accuracy. Studies report reductions in plaque indices when disclosing agents are incorporated into self-care or professional instruction. Visual cues increase motivation, self-monitoring, and reinforce proper technique. **Conclusion:** Plaque disclosing agents are low-cost, high-impact tools that transform invisible biofilm into actionable information. Their use at home and in clinical settings supports better plaque control, improves engagement, and contributes to long-term oral health.

#001 - Allen, Alexis

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Daniel Carruth, CAVS Research
Co-Author(s): Christopher Hudson
Funding: BRIDGES | **Project Category:** Engineering

Bridging Autonomous System Integration and Field Testing

Evaluating autonomous ground vehicle performance requires structured, scenario-based testing that translates operational concepts into measurable vehicle behaviors. Standard tests must also be consistently implemented at multiple test sites across NATO partner nations. NATO's Loyal Wingman integrates 36 individual tests into a mission-based scenario designed to evaluate a team of 2 autonomous systems paired with 1 crewed vehicle. Mississippi State University's Center for Advanced Vehicular Systems (CAVS) is supporting NATO's efforts by implementing the tests on the CAVS off-road proving ground to evaluate the NATO autonomy stack running on the CAVS self-driving MRZR D4. The main challenge is to adapt rather than duplicate the tests, since the full operational environment cannot be perfectly replicated on the 55-acre CAVS off-road proving ground. Our testing primarily uses the CAVS 'Mobility Area', a constrained, flat, and open testing area. Selected Loyal Wingman tests are decomposed into their core elements, such as vehicle spacing, motion coordination, detection ability, and interaction behaviors. After breaking them down, they are systematically mapped onto the available space on the CAVS proving ground. Once tests are implemented in the field, the CAVS MRZR platform serves as a validation vehicle, executing the autonomy stack and collecting performance data. Carrying out these tasks offers vehicle-level insights, reveals limitations in both the autonomy stack and test designs, and helps refine the NATO demonstration plan. This project demonstrates a collaborative effort to turn operational autonomy concepts into practical vehicle experiments across multiple testing environments.

#002 - Ambrose, Andrea

Major: Software Engineering - Bachelor of Science
Faculty Research Mentor: Brady Swann, Raspet
Funding: B.R.I.D.G.E.S | **Project Category:** Engineering

Designing Web Applications for Mission Planning and Analysis of Autonomous sUAS

Developing mission-planning tools that clearly present complex system behavior to Test Conductors at the Raspet Flight Research Laboratory is crucial for mission planning and performance analysis of small Uncrewed Aircraft Systems (sUAS). This controlled project introduces a graphical user interface (GUI) that aids in mission planning optimization and real-time aircraft monitoring. Built with React and Mapbox, the application delivers fast rendering, responsive user interaction, and flexible customization aligned with the external project's research requirements and software integrations. The interface contains two core modules. First, the mission planner enables Test Conductors to map out flight paths, geofences, and no-fly zones using the Mapbox Draw UI Plugin for visualization on an interactive map. Additionally, on the sidebar, users can edit constraints such as soaring modes (i.e. using thermal, ridge, and/or wave lifts) and set a path deviation limit. Then, users submit their plan to an optimization algorithm to instantly view suggested plans that they can refine and compare. The second module is a live dashboard view that displays real-time flight monitoring updates such as battery level, altitude, air speed, and geofence alerts through subscriptions to Robot Operating System (ROS) topics. This dashboard display condenses a range of important updates from the sensors on the aircraft into an easily readable layout. This work demonstrates how user-centered interface design enhances clarity and improves safe decision-making for Test Conductors, ultimately supporting more efficient evaluation of autonomous sUAS performance.

#190 - Anderson, Hayden

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Russell Carr, Department of Comparative Biological Sciences
Co-Author(s): Shirley Guo-Ross, Anna Marie Clay, Kendall McKinnon, Hannah Mask, Lexi Holdiness
Funding: None | **Project Category:** Biological and Life Sciences

Development of a Preclinical Model that can be used to Test Novel Therapeutics for the Treatment of Mild and Moderate Traumatic Brain Injury

Traumatic Brain Injury (TBI) occurs when a foreign object induces damage to the skull and brain through a forceful blow or whiplash. It is one of the most frequent injuries in the United States. It is well known that severe TBIs can result in persistent physical, cognitive, and socioeconomic consequences and the timing of treatment following this injury can play a critical role in the ultimate outcome. Developing a safe therapeutic that can be administered rapidly after injury could improve recovery. However, most TBIs are mild, and the current treatment is largely limited to rest. Therefore, it would be beneficial to have a safe therapeutic to improve the long-term outcome of mild TBI. Unfortunately, negative biochemical and morphological changes following mild TBI in preclinical models are not present, greatly reducing their use as indicators of improvement. However, subtle behavioral changes induced by mild TBI may be more useful as an indicator. The goal of this project is to establish a mild to moderate TBI model that could be used to test therapeutics using subtle behavioral changes. To model mild TBI, a weight drop device was used to deliver a 2.25J impact in adult male rats. Behavioral performance on a ledged balance beam and in an open field was determined. On the beam, the TBI Rats had a higher number of foot slips than the control rats, but the controls traveled a greater distance before they had to use the ledge for support than the TBI rats. In the open field, there were no differences in the locomotor activity between the groups, but the TBI rats exhibited a different habituation pattern compared to controls. Thus, these subtle behavioral changes may be useful endpoints that can be used to determine if a therapeutic intervention exerts a positive effect following mild TBI.

#191 - Annageldiyeva, Dilber

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Maryam Mohammadi-Aragh, Ag & Bio Engineering
Co-Author(s): Maryam Mohammadi-Aragh, Jessica Drewry, Katie Elliott
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Impact of Hatchery Location and Flock Age on Hatching Egg Bacterial Abundance

Eggshell bacterial contamination varies among poultry operations and may affect chick quality and hatchery sanitation needs. This study evaluated how hatchery location and flock age influence eggshell aerobic bacterial loads. Eggs were collected from two commercial hatcheries (Location A and Location B) and from two flock-age groups: younger pre-peak hens (30–35 weeks) and older post-peak hens (46–50 weeks). Approximately 30 eggs per group ($n = 128$) were sampled. Total aerobic bacteria were measured using Aerobic Count Petrifilms and analyzed using a two-way ANOVA. Significant effects of hatchery location, flock age, and their interaction were detected ($P < 0.0001$). Mean aerobic counts were 3.5 $\log_{10}$ CFU/mL for Location A and 4.1 $\log_{10}$ CFU/mL for Location B. Young flocks averaged 4.3 $\log_{10}$ CFU/mL, while old flocks averaged 3.3 $\log_{10}$ CFU/mL. The hatchery × age interaction showed that Location A had much larger age-based differences than Location B. These results suggest that hatchery-specific management practices and hen age strongly affect background eggshell bacterial loads.

"The test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function."
- F. Scott Fitzgerald

#192 - Appleton, Hunter

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Megan Holmes, Department of Kinesiology
Co-Author(s): Guillermo Oviedo, Kya Davis, Vikaas Manjunath
Funding: ORED Undergraduate Research Program | **Project Category:** Biological and Life Sciences

Impact of Obesity, Physical Activity, and Aerobic Fitness on Arterial Stiffness in School-Aged Children

Childhood obesity is an important health concern, as it increases the risk of cardiovascular disease. One early marker of cardiovascular problems is arterial stiffness, which reduces arterial flexibility and increases strain on the heart. While arterial stiffness is well documented in adults, less is known about when these changes begin in children and how they are influenced by physical activity and fitness. This study will examine the relationship between obesity, physical activity, aerobic fitness, sleep, and arterial stiffness in children ages 9–15 years. Each participant will complete a single laboratory visit (60–75 minutes) followed by one week of physical activity monitoring. During the lab session, height, sitting height, weight, and waist circumference will be measured using standardized protocols, and body composition will be assessed with bioelectrical impedance analysis. Because the ages of participants span pre- and peri-pubertal ages, a non-invasive indicator of maturation will be determined from anthropometric indicators (Maturity Offset). Arterial stiffness will be determined by assessing the carotid-to-femoral pulse wave velocity using a tonometer and blood pressure cuff. Resting blood pressure will also be collected with a pediatric oscillometric device. Aerobic fitness will be estimated with the Physical Work Capacity at 170 bpm (PWC170) submaximal cycling test. To capture lifestyle behaviors, children will wear an ActiGraph GT3X+ accelerometer for seven consecutive days and complete a brief physical activity and health questionnaire. Families will also complete a daily sleep diary, recording bedtime, wake time, and sleep disruptions. Likewise, mental health indicators (PHQ and GAD-7) will also be assessed. By considering children across the weight status spectrum, this study aims to determine whether excess weight, lower physical activity, lower aerobic fitness, and altered sleep patterns are associated with stiffer arteries. Identifying these early changes may guide prevention strategies to lower future cardiovascular risk.

#193 - Ardoin, Avery

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Peixin Fan, Animal & Dairy Science
Co-Author(s): Himani Joshi, Abigail McBride, Jalyn Hawkins, Marcus McGee, Amelia Woolums
Funding: USDA | **Project Category:** Biological and Life Sciences

Integrating Machine Learning and Manual Evaluation to Assess Dairy Cows' Behavior Dynamics Under Heat Stress

Dairy cows exhibit distinct behavior under heat stress. This study evaluated maintenance and social behaviors of dairy cows associated with heat stress. Twenty-four lactating Holsteins (heat-stress (HSH) and heat-relieved (HRH) groups), and twelve heat-stressed Jersey cows (HSJ) were housed in free stalls during summer for 14 days (THI>72 from 1200-2000). The HRH had access to fans and sprinklers, while the HSH and HSH had limited access to them. Behavior was video recorded. Maintenance behaviors (standing, lying, eating, and drinking) over 13h/day were analyzed using a pre-trained YOLOv8 model (93% precision). Social behaviors (agonistic and affiliative) were annotated and analyzed manually. Data were analyzed using mixed models in SAS 9.4. Comparisons between Holsteins showed that HSH spent more time drinking/day (48.2 vs. 12.6 min, $P<0.0001$), and at all time points ($P<0.0001$) than HRH. At noon, HSH tended to stand more (21.2 vs. 15.6 min, $P=0.07$) than HRH, while no differences were found in lying or eating behaviors between groups. Interestingly, comparisons between HSH and HSJ showed that HSH spent more time lying than HSJ/day (6.7 vs. 5.3 h, $P=0.006$). At noon, HSH showed greater lying time (35.29 vs. 27.06 min, $P=0.016$), whereas HSJ spent more time standing (26.53 vs 18.95 min, $P=0.01$) and drinking (6.65 vs. 4.38 min, $P=0.008$). During evening, HJ spent more time standing than HSH (1.7 vs 1.4 h, $P=0.007$). Social behaviors (times/day/cow) were not significantly different between HSH and HRH; however, between HSH and HSJ, HSJ performed (4.5 vs 2.75, $P=0.005$) and received (4.6 vs 2.75, $P=0.01$) greater agonistic and received greater affiliative (1.46 vs 0.51, $P=0.0002$) behavior than HSH. Overall, our results showed HSH exhibited more heat coping behaviors such as increased drinking than HRH, while HSJ exhibited active heat-stress coping by greater standing, drinking, and social behavior than Holsteins.

#127 - Armstrong, McKenzie

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Danielle Nadorff, Psychology
Co-Author(s): Amara Mason, Danielle Nadorff, Amara Mason
Funding: None | **Project Category:** Social Sciences

Where Identity Begins: Caregiver Impact on Racial Identity and Well-being

This study examined whether racial identity moderates the relation between caregiver type (biological parents vs alternative caregivers) and mental health within emerging adults. It investigates the influence of the caregiver on the individual's racial identity and the different mental health outcomes that they experience. Theories utilized in this study, such as the Ecological Systems Theory, Social Identity Theory, and the Racial Identity Development Theory, emphasize the importance of biological, psychological, psychosocial, and environmental factors that impact the overall well-being of the individual. A sample of college students ages 18-25 attending a southern U.S. university will complete self-report measures assessing caregiving type, racial identity, depression, anxiety, and previous mental health diagnoses. Measures include World Health Organization Quality of Life-BREF (WHOQOL-BREF), Ethnic Identity Scale (EIS), Center for Epidemiological Studies-Depression (CES-D), and Beck Anxiety Inventory (BAI). Findings from this study can further address cultural gaps in caregiving environments and provide contextual interventions for mental health and racial identity to support emerging adults and society at large. It is hypothesized that emerging adults' mental health outcomes will significantly differ across different racial identities based on caregiver type, with participants who were raised by grandparents reporting poorer mental health than those raised by biological parents, more specifically BIPOC participants. At the time of submission, data collection and analysis are currently in progress and will be completed prior to presentation at the symposium.

#128 - Baker, Sydney

Major: Ag Educ., Leadership & Comm - Bachelor of Science
Faculty Research Mentor: OP McCubbins, School of Human Sciences
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Social Sciences

Exploring Perceptions of 360 Video and Virtual Reality

As the demand for immersive and engaging instructional tools in agriculture education increases, 360 Video and virtual reality (VR) offer innovative opportunities to enhance experiential learning. Traditional instructional methods often rely on lectures, which limit students' ability to fully visualize real-world procedures and environments. 360 video provides a safe environment to learn about hazards within the agricultural industry. This study sought to explore the perceptions of College of Agriculture and Life Sciences students regarding the use of 360-degree video as an instructional tool. Specifically, this study sought to assess participant engagement, perceived usefulness, and instructional potential of 360 VR experiences. Participants completed a pre-survey, viewed a donning and doffing personal protective equipment (PPE) 360 video in a VR headset, and a post-survey. The donning and doffing PPE 360 videos were developed as a part of a broader effort to incorporate immersive technology into agriculture teacher preparation and CTE instruction. The videos explained hazards, proper donning and doffing procedures, and handling of contaminated PPE. Data collection is ongoing. The researchers anticipate the data will provide insight on the utility of 360 VR as an instructional tool and the potential of immersive technologies for teaching and learning in and about agriculture. Exploring user perceptions aids future curriculum development and contributes to the best practices of implementing immersive technology into agriculture teacher and CTE education.

#194 - Barksdale, Natalie

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Scott Rush, FWRC - Wildlife, Fisheries & Aquaculture
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Genetic Diversity of Mediterranean Gecko (*Hemidactylus turcicus*) Within and Among University Campuses

Since the development of efficient transportation, species, known as "jump dispersers", which are transported by

people, can travel further distances. This novel dispersal ability can create considerable differences in genetics between parent populations and founder populations, particularly in species less prone to genetic mutation. The Mediterranean Gecko (*Hemidactylus turcicus*) is a "jump disperser". Without human transport, this species exhibits little dispersal, but they have high genetic mutation rates. With unintended human transport, this species has spread from its native range of West Asia and the Mediterranean Basin to urban areas across eastern North America. Sampling this species in several geographic locations, we will contrast the genetic structure of populations within versus among sample sites. This process will allow us to identify the difference in interpopulation and intrapopulation genetic diversity of this species within our sample area. Insights gained through this work will enable us to evaluate the effects of dispersal on the genetic structure of Mediterranean Geckos on Mississippi State University's campus and beyond. This project has bearing on how we appreciate dispersal, whether natural or aided, on the genetics of various organisms and their influence on the communities they inhabit.

#195 - Bates, Skylar

Major: Landscape Architecture - Bachelor of Landscape Arch
Faculty Research Mentor: SaMin Han, Landscape Architecture
Co-Author(s): Adam Frost
Funding: None | **Project Category:** Biological and Life Sciences

Common Grounds: A Resilient Landscape Strategy for Flood Adaptation and Community Connection in East Biloxi, Mississippi

East Biloxi, Mississippi faces increasing environmental and social challenges as sea level rise, storm surge, and chronic flooding continue to threaten coastal communities along the Mississippi Gulf Coast. Historically, East Biloxi has also experienced social fragmentation, limited access to public amenities, and underutilized vacant land. This project explores how landscape architecture can address both ecological resilience and community connectivity through strategic design interventions. The project, titled *Common Grounds*, proposes a resilient civic landscape that transforms vacant parcels and the bayou edge into an integrated system of ecological infrastructure and public gathering spaces. Through site analysis, demographic research, and coastal flood modeling, the study examines the impacts of projected sea level rise on East Biloxi and identifies opportunities for adaptive landscape strategies. Flood risk scenarios ranging from one to ten feet of sea level rise reveal increasing inundation along bayous and adjacent development, highlighting the need for flexible and nature-based design solutions. The proposed master plan introduces a network of social, recreational, and ecological spaces designed to strengthen community identity while improving environmental performance. Key design elements include a central gathering plaza, mixed-use event spaces, a boardwalk and bayou overlook, restored wetlands, native planting systems, and an extended-hours playground. Stormwater management strategies such as permeable paving, geocellular storage systems, and an urban discharge plaza are integrated throughout the site to manage flooding while enhancing public space. Together, these interventions create a landscape that supports ecological restoration, improves pedestrian connectivity, and fosters social interaction. By combining resilient infrastructure with culturally meaningful public spaces, the project demonstrates how landscape architecture can help coastal communities adapt to environmental change while promoting equity, inclusivity, and long-term sustainability.

#196 - Beard, Allison

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Sandra Correa, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Aaron Johnson, Michael Sandel, Leandro Miranda
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Niche Partitioning and Dietary Overlap of Native Sunfish (*Lepomis* spp.) in Mississippi Oxbow Lakes

Interspecific competition for limited resources is a primary driver of community structure in aquatic ecosystems. While adult sunfishes are often characterized as macroinvertebrate or piscivorous predators, their juvenile stages (20–80 mm) rely more on zooplankton, potentially leading to significant dietary overlap and competition. This study investigates niche partitioning among a diverse assemblage of Lepomis species, including Bantam Sunfish,

Orangespotted Sunfish, Bluegill, and Warmouth. To overcome the limitations of traditional morphological diet analysis, which often underrepresents soft-bodied prey and is restricted by the difficulty of identifying prey taxa to the species level, we utilize DNA metabarcoding of gut contents. This molecular approach provides higher taxonomic resolution and identifies easily missed prey items that are critical for understanding juvenile fish health. DNA was extracted from the digestive tracts of Lepomis specimens using the QIAGEN DNeasy Blood & Tissue protocol to ensure high-purity yields for PCR amplification of the Cytochrome Oxidase I (COI) gene. By analyzing the dietary components of these sunfish across various species and size classes, this research aims to quantify dietary similarities and identify potential niche shifts. These findings will highlight the competitive dynamics within native sunfish communities and contribute to the broader development of a competition index for managing vital fish habitats in Mississippi oxbow lakes.

#129 - Berger, Abby

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Anna Osterholtz, Anthropology/Middle Eastern Culture
Funding: Presidential Endowed Scholarship Funding | **Project Category:** Social Sciences

Using Stable Isotopes to Analyze the Diet of Middle to Late Bronze Age Individuals from Bezdanjača Cave, Croatia

This presentation details the analysis of the diet of 31 individuals (16 females, 8 males, and 7 non-adults) from the Middle — Late Bronze Age (1430 -1290 BCE) site of Bezdanjača Cave (Croatia) using stable carbon and nitrogen isotopic analysis. The isotopic ratios of carbon (δ13C) and nitrogen (δ15N) measured in samples from the occipital and frontal bones provide insight into an individual's long-term diet because carbon and nitrogen from consumed foods are incorporated into the individual's bone collagen over the course of a lifetime. Carbon isotope values distinguish between C_3 and C_4 plant consumption based on differences in their photosynthetic pathways. Individuals consuming C_4 plants, such as maize and millet, show more enriched (less negative) δ13C bone collagen values than those who primarily consume C_3 plants like wheat and rice. Nitrogen isotope values indicate the individual's trophic level and generally increase with increased consumption of animal proteins. Overall, the isotopic ratios from the individuals at this site suggest the consumption of C_4 plants, likely broomcorn millet based on archaeobotanical analysis in the region. During the Middle to Late Bronze Age, broomcorn millet had spread to central Europe and was becoming a more-preferred cultivar. The Lika region of Croatia had poor growth conditions, allowing for drought-tolerant, fast-growing plants such as broomcorn millet to thrive. This finding is consistent with published models of the spread of broomcorn millet throughout Eurasia. Furthermore, statistical analysis showed that the adult males had higher δ13C values when compared to the adult females, so the males were likely consuming more broomcorn millet or another carbon-enriched source. No significant differences in δ13C were observed between non-adults and either adult group. For δ15N, there were no significant statistical differences between males, females, and non-adults, indicating that they were on the same trophic level.

#105 - Bhagat, Kitashu

Major: Physics - Bachelor of Science
Faculty Research Mentor: Lacey Fitts, Teacher Education &Leadership (TEAL)
Co-Author(s): Liza Bondurant, Tristan Brewer
Funding: None | **Project Category:** Education

Assessing Prior Exposure and Future Impacts of Integrated STEM Learning

Secondary education increasingly emphasizes STEM integration, yet student exposure to such investigations remains inconsistent. While prior research has explored the role of technology in student engagement, there is a gap in understanding the perceptions and prior experiences of high school seniors in the southeastern United States. This study explores the extent of these students' previous encounters with integrated STEM and the resulting impacts on their learning. We conducted a focus group with four high school seniors from the southeastern U.S. participating in a luminance activity designed to integrate secondary content through technology. We report on their perceptions of this experience and how it compares to their prior academic history. By analyzing these qualitative insights, this

research identifies pedagogical implications for using technology-driven, interdisciplinary activities to bridge gaps in student exposure and enhance future STEM outcomes.

#003 - Bhattarai, Prashant

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Daniel Carruth, CAVS Research
Co-Author(s): Chris Goodin, Christopher Hudson
Funding: B.R.I.D.G.E.S | **Project Category:** Engineering

Centralized Versus Decentralized Multi-Agent Coordinated Navigation for Autonomous Vehicles

Autonomous vehicles operating in shared environments must navigate safely while accounting for obstacles and the presence of other autonomous agents. As the number of vehicles increases, coordination strategies play a critical role in determining navigation efficiency, communication overhead, and overall system robustness. This research focuses on comparing centralized and decentralized multi-agent coordinated navigation architectures for autonomous ground vehicles using simulation-based experiments. The study uses MAVS for simulation and Robotics Operating System (ROS2) for Robotics based software. In a centralized system, vehicles rely on a shared planning structure with access to global information to coordinate obstacle avoidance and path planning. In contrast, a decentralized system allows each vehicle to operate using local perception and limited communication, such as sharing position, velocity, or high-level intent with nearby agents. This study investigates how these two approaches differ in terms of navigation performance and communication efficiency when multiple vehicles operate in the same environment. Simulated environments with randomly placed obstacles are used to evaluate vehicle behavior under both coordination strategies. Performance metrics include collision rate, path efficiency, and communication usage as the number of vehicles increases. The results of this research aim to provide insight into how coordination architecture influences coordinated navigation in autonomous systems.

#080 - Bhattarai, Swarup

Major: Physics - Bachelor of Science
Faculty Research Mentor: Jeff Winger, Physics & Astronomy
Co-Author(s): Prajwal MohanMurthy, Maruf Abubakar
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Physical Sciences

Simulation Framework for Precision Studies of the Fierz Interference Term in the β^+ decay of ^{22}Na

The β^+ decay of ^{22}Na (3^+) $\rightarrow$ ^{22}Ne (2^+, 1.274 MeV) offers a sensitive probe for exotic scalar or tensor currents through the Fierz interference term *b,* which modifies the shape of the positron energy spectrum. The last direct measurement of *b* in ^{22}Na, performed nearly six decades ago, underestimated systematic uncertainties yet remains an influential input to the global analysis of the CKM matrix element V_{ud}. This work develops a simulation framework to quantify how variations in *b* influence the observed β^+ spectrum, including detector-response and background effects. Using the Beta Spectrum Generator (BSG) for relativistic kinematics and spectral corrections, coupled with Geant4-based modeling, we investigate the impact of Photoelectric effect, Compton, Pair-production, Bremsstrahlung, Nuclear scattering, and Rayleigh scattering processes on the reconstructed spectra combined with high-statistics simulations (10^7–10^8 events per configuration). The resulting simulations establish a quantitative basis for assessing spectral sensitivity to *b* and identifying detectors configurations best suited for remeasurement of the ^{22}Na β^+ spectrum using a high-purity germanium semiconductor detector. These studies provide essential groundwork for refining the design criteria needed to reach a sensitivity of $b < 0.01$ (90% Confidence Level), thereby constraining exotic scalar and tensor couplings with improved precision.

#197 - Birchfield, Kylie

Major: Forestry - Bachelor of Science
Faculty Research Mentor: Adam Polinko, FWRC - Forestry
Co-Author(s): Esteban Galeano, Getrude Aturu
Funding: College of Forest Resources URSP | **Project Category:** Biological and Life Sciences

Analysis of Five Longleaf Pine Provenance Seedlings Under Heat and Drought Conditions

Longleaf pine (Pinus palustris) is a key species that is both ecologically and economically important in the Southeastern US. This pine species is highly important for wood production, restoration, and ecosystem services. It is well-known for its impressive growth rate, longevity, high-quality wood, and capacity to thrive in diverse environmental conditions. This makes it a resilient and valuable species for restoration and tree improvement (which is the process of selecting the trees that are outperforming in a plantation to increase gains). Additionally, longleaf pine has consistently shown tolerance to heat and drought conditions with field observations without rigorous studies. However, research under these stressors is very limited. For this research, we established an agreement with the USDA Forest Service to analyze some of their seed material and inform the best material to plant and where to plant. Seeds have been stratified and sown in November 2024 in the greenhouse located at Mississippi State University's Forest Operations and have been established in the last five months whilst determining that seed storage likely has no impact on germination rates. We will analyze five provenances (Mississippi, Texas, Florida, Alabama, and Louisiana) outside of the greenhouse. The seedlings will be moved outside of their supercells and transported to larger pots. We will be evaluating 600 seedlings performance in heat and drought conditions. For the experimental design, we will conduct a randomized complete block design with three blocks, four treatments (T1= control, T2= heat, T3= drought, T4= heat + drought) and five provenances (five states= Mississippi, Texas, Florida, Alabama, and Louisiana). Each block will have ten tree saplings per treatment per provenance, with a total of 30 trees per treatment per provenance (grand total of 600 trees).

#004 - Black, Cooper

Major: Software Engineering - Bachelor of Science
Faculty Research Mentor: Daniel Carruth, CAVS Research
Co-Author(s): Christopher Hudson, Timothy Sellers
Funding: CAVS Research | **Project Category:** Engineering

CI/CD Pipeline Development for Autonomous Vehicles

Scenario-based testing is a standard approach for evaluating autonomous systems during development. Using simulation to support scenario-based testing is particularly useful because it enables repeatable assessments of perception, planning, and control behaviors under diverse conditions. To develop a robust autonomous vehicle capability, developers must incorporate scenario-based testing into a continuous integration and continuous deployment (CI/CD) pipeline. This project investigates methods for integrating simulation-based scenario tests into a traditional CI/CD workflow to support autonomous ground vehicle development. We use GitLab to automate the testing of individual ROS nodes and navigation stacks. Within our CI/CD pipelines, we have established Podman containers for development and deployment, which allow us to verify that code pushed to a development branch meets all criteria before being merged into the main branch of each repository. For testing, we utilize GitLab Runner along with our proposed testing framework. We extend this framework to automate the execution of scenario-based tests within the Mississippi State University Autonomous Vehicle Simulator (MAVS). This integration enables multi-node ROS systems, sensor models, and navigation stacks to be evaluated at the integration and system level as part of the software development process. For continuous deployment, our vehicles automatically pull the most up to date container containing our developed code, ensuring that all required packages are available on the vehicle. This system automatically tests code when it is pushed to the repository and deploys it to the vehicle once it passes all tests, streamlining our workflow and increasing confidence in the autonomy software being evaluated. This work demonstrates how traditional CI/CD practices can be adapted to the unique requirements of autonomous systems by integrating simulation-based, scenario-driven testing, providing a robust engineering framework for RDT&E workflows.

#198 - Blackstock, Rebecca

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Federico Hoffmann, Biochemistry Nutrition Health Promotion
Co-Author(s): Hunter Walt
Funding: None | **Project Category:** Biological and Life Sciences

Transcriptomic Effects of an α-mannosidase Inhibitor in Human Hepatocytes

Glycosylation is an essential cellular process that affects protein folding, stability, cell signaling, and extracellular matrix formation. During glycosylation, complex sugar molecules called glycans, composed of linked monosaccharides, are enzymatically assembled and attached to proteins or lipids. Disruptions in glycan processing can interfere with normal cellular function, but the broader effects on liver cell gene expression are not fully understood. In this study, we used swainsonine, a compound that inhibits α-mannosidase enzymes involved in glycosylation, to determine how inhibition of a key step in glycan processing alters gene expression in human hepatocytes. Hepatocyte samples were treated with low (1 μM) and high (10 μM) doses of swainsonine and compared to untreated controls. Total RNA was extracted and sequenced to measure transcript abundance and identify differences in gene expression between groups. Clear differences in overall gene expression patterns were observed between treated and control samples, indicating that swainsonine exposure produces consistent transcriptional changes. Further analysis identified distinct clusters of genes with similar patterns of expression in response to swainsonine dose. One major gene cluster was enriched for functions related to cytoskeletal organization, inflammatory signaling, and cell-cell junction regulation. Pathways such as IL-17 signaling, TNF signaling, Hippo signaling, and tight junction processes were enriched within this group. These findings suggest that inhibiting glycan processing influences structural integrity and signaling networks within liver cells and may have consequences related to immune responses and cancer. Overall, this study shows that disrupting a single step in glycan processing can affect the global hepatocyte transcriptome and provides insight into the molecular consequences of disrupting protein processing in hepatocytes.

#199 - Bloodworth, Maxwell

Major: Agronomy - Bachelor of Science
University: Hernando, MS
Faculty Research Mentor: Te-Ming Paul Tseng, Plant and Soil Sciences
Co-Author(s): Alyssa Miller
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evaluating Sweet Potato Variety Tolerance to Herbicides and Analyzing Herbicide Residues in Storage Roots

Sweet potato (Ipomoea batatas) is the sixth most important food crop globally and a high-value commodity in Mississippi. Weed management remains a major challenge in sweet potato production due to the limited number of herbicides currently labeled for use in the crop. Problematic weeds such as Palmer amaranth (Amaranthus palmeri), ivyleaf morningglory (Ipomoea hederacea), and yellow nutsedge (Cyperus esculentus) are often inadequately controlled, necessitating evaluation of additional herbicide options. Field experiments were conducted in 2024 and 2025 at the Mississippi Agricultural and Forestry Experiment Station in Pontotoc, MS, to evaluate the tolerance of the 'Beauregard' sweet potato cultivar to selected pre-emergence (PRE) and post-transplant (POST) herbicide treatments. PRE treatments included fluridone, linuron, metribuzin, sulfentrazone, diclosulam, and imazethapyr, while POST treatments included metribuzin, linuron, acifluorfen, tolpyralate, and bentazon, along with a weed-free control. Crop injury was visually assessed at 7, 14, 21, and 28 days after treatment (DAT), and yield was harvested and graded into jumbo, U.S. No. 1, canner, cull, and total marketable categories. Results indicated that bentazon, fluridone, metribuzin (PRE), sulfentrazone, and tolpyralate caused greater foliar injury than diclosulam and imazethapyr. POST applications of linuron and metribuzin resulted in moderate early-season injury that diminished over time and significantly increased marketable yield compared to the weed-free control. Diclosulam PRE produced the highest crop injury at 28 DAT (7%). Metribuzin POST increased total marketable yield by 2,072.12 kg ha^{-1}, while linuron POST increased total marketable yield by 3,390.64 kg ha^{-1} and U.S. No. 1 yield by 2,771.8 kg ha^{-1} relative to the weed-free control. These results suggest that POST applications of linuron and metribuzin have potential for inclusion in sweet potato weed

management programs to improve weed control and maintain yield. Future research will focus on residue analysis to support food safety evaluations and potential label expansion.

#200 - Boothe, Ella Kate

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Jhennys Becerra Ossa, Biochemistry Nutrition Health Promo
Co-Author(s): Preston Frazier, Carrie Ruth Jackson, Fatima Gonzalez, Cannon Parker, Mary Parker
Funding: None | **Project Category:** Biological and Life Sciences

Winter Radish Growth Under Varying Nitrogen, Phosphorus, and Potassium Conditions
A key goal in the agricultural industry is to identify fertilizer strategies that support consistent, high-quality produce. A winter pilot study was conducted on Cherry Belle radishes (*Raphanus sativus*) to explore how varying nitrogen (N), phosphorus (P), and potassium (K) inputs (N–P–K) influence growth. Twenty-four seeds (four per pot) were planted in six pots with a standardized substrate (50% sand, 40% topsoil, 10% perlite). Pots received N–P–K target conditions using urea, super triphosphate, and muriate of potash, weighed and applied in grams per pot (order: urea, super triphosphate, potash): Pot A (10-5-5) = 3.04 g, 1.52 g, 1.17 g; Pot B (5-10-5) = 1.52 g, 3.04 g, 1.17 g; Pot C (5-5-10) = 1.52 g, 1.52 g, 2.33 g; Pot D (5-5-5) = 1.52 g, 1.52 g, 1.17 g; Pot E (10-10-10) = 3.04 g, 3.04 g, 2.33 g; Control (0-0-0) = 0 g, 0 g, 0 g. Plants were watered every third day for 28 days; stem height (cm) was tracked, and final stem and root measurements were taken on day 28. Germination was 4/4 seeds for the control and Pots A–D, and 3/4 for Pot E. In this unreplicated exploratory setup (one pot per treatment), Pot D showed the strongest vegetative development (final stem height: 10 cm), whereas Pot E showed the least (3 cm). These observations suggest higher nutrient input may suppress early vegetative growth under the conditions tested; replicated trials are needed for statistical inference. Limitations include lack of replicated pots, limited seasonal environmental control, and a short duration that may not allow full root maturation. Future work will replicate treatments and evaluate results across seasons with tighter environmental control and longer growth periods to determine optimal N–P–K conditions for radish production.

#201 - Bordeaux, Allie

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Caleb Lemley, Animal & Dairy Science
Co-Author(s): Hala Eldaous, Sophie Van Herik, Megan Patterson, Kasey Elder, Shiveeli Rajput, Justin Maynard
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evaluating Associations of Heat Stress and Reproductive Potential in Beef Cattle
Beef cattle infertility costs the US nearly $2.8 billion annually. Cow-calf production and profitability depend on conception and preventing pregnancy loss in beef cattle. Environmental factors, notably high environmental temperatures, are known to compromise fertility and reproductive performance for a variety of reasons. For example, heat stress can lower dry matter intake, energy homeostasis, and reproductive hormones. Southeastern producers conduct estrous synchronization and artificial insemination (AI) in spring and late autumn, coinciding with fluctuations in temperature and humidity. To quantify the implications of heat stress and the magnitude of its effects, this study utilized the HOBO TidbiT v2 Water Temperature Data Logger to track vaginal temperature in two replicates. The cows (n=40 for replicate 1 and n=40 for replicate 2) underwent ultrasonography, plasma estradiol testing, and heat patch testing to evaluate reproductive parameters in two replicates during late spring and late summer, comparatively. With this temperature data, the correlation of vaginal temperature, plasma estradiol concentration, heat status, and follicular status were determined using RStudio. Vaginal temperature showed a moderate positive correlation (0.3971; p = 0.06724) with plasma estradiol concentrations during the first replicate in May and a moderate negative correlation (-0.3981036; p=0.03925) with plasma estradiol concentrations in June. The use of this temperature data logger in beef cattle to monitor vaginal temperature is novel and could provide insight to producers on management improvements as it pertains to heat stress and reproduction and ultimately reduce monetary loss. Ultimately, tracking vaginal temperature could potentially increase the accuracy of projecting when cows reach estrus.

#088 - Bowers, Rachel

Major: Landscape Architecture - Bachelor of Landscape Arch
Faculty Research Mentor: Jason Walker, Landscape Architecture
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Arts, Music, & Design

Mapping Access: A GIS-Based Analysis of Park Accessibility in Starkville, Mississippi

Parks play a critical role in enhancing community well-being by promoting physical activity, social connection, and mental health while also contributing to environmental sustainability. Despite these benefits, many communities face barriers to park access, including distance, infrastructure limitations, and physical obstacles. Specifically, low-income areas often are disproportionately impacted by park development, with generally less walkway accessibility and green space options. This study provides an assessment of park accessibility in Starkville, Mississippi, using Geographic Information System (GIS) analysis to evaluate the current park system network. It inventories amenities and maps each park's service area to determine whether residents have access to a park within a 10-minute walk, aligning with the National Recreation and Park Association's (NRPA) 2050 goal. The research identifies geographic and infrastructural gaps in park access and offers data-driven insights to guide future park development and improve equitable access across the city.

#089 - Bratton, Piper

Major: Landscape Architecture - Bachelor of Landscape Arch
Faculty Research Mentor: SaMin Han, Landscape Architecture
Co-Author(s): Eden Revels
Funding: National Academies of Sciences, Engineering, and Medicine | **Project Category:** Arts, Music, & Design

Bay Side: Sponge Microcity in East Biloxi

Located in northeastern East Biloxi, the Back Bay area represents both Mississippi's historic seafood heritage and its climate vulnerability. Nearly two decades after Hurricane Katrina, vacant lots, struggling seafood operations, and a degraded shoreline persist. With median household incomes near $26,000 and inadequate flood-resilient housing, this multicultural community faces compounding environmental and economic fragility. Bay Side reimagines the near 100-acre waterfront as a climate-resilient sponge microcity that restores ecological function and community vitality while honoring the region's deep relationship with water. Through site analysis, affordability studies, and community engagement, the design responds to resident-identified priorities: affordable housing, multi-generational spaces, and ecological restoration. Adapting fifteen-minute city principles to a walkable five-minute framework, the vision integrates mixed-use housing, grocery access, health services, business incubators, educational facilities, and recreation. Amphibious structures elevated above flood thresholds provide affordable and market-rate housing, while living shorelines, breakwaters, and restored wetlands support marine, avian, and amphibious species. Embedded research facilities enable long-term estuarine monitoring, positioning Bay Side as both neighborhood and living laboratory. Four integrated systems define the district: living breakwaters and tidal wetlands reestablish the natural bay edge; green streets prioritize pedestrian connectivity; meandering boardwalks invite habitat engagement; and sunken recreational spaces, skate park, courts, and multi-use fields, double as stormwater retention basins. Bioswales and berms redirect water while nourishing native plantings, transforming drainage liabilities into ecological assets. By employing sponge design principles, permeability, bioretention, and distributed storage, Bay Side converts flood vulnerability into resilience infrastructure. The result is an equitable, climate-adapted model demonstrating how blue-green systems can protect human wellbeing, sustain ecological health, and strengthen coastal communities facing intensifying climate pressures.

#130 - Bridges, Gabrielle

Major: Fashion Design & Merchandising - Bachelor of Science
Faculty Research Mentor: Zahed Arman, Communication
Co-Author(s): Halle Holman, Maddie Hughes, Kaitlyn Thomas
Funding: None | **Project Category:** Social Sciences

Exploring the changes in college students' attitudes following Netflix's 2023 policy changes.
Netflix, a subscription based streaming service that allows users to watch TV and movies recently introduced a controversial policy change. In 2023 the brand implemented a password sharing crackdown, that implemented a rule that you have to use a netflix account in the same physical location. This change directly impacted college students, who majority lived in different homes than their parents. To further understand the impact of loss of brand trust on consumer behaviors, this study investigated the changes in college students' attitudes towards Netflix following these policy changes. For this study, a survey was administered from March 10, 2026, March 19, 2026, to measure the attitudes and trust of college students based on the new Netflix household policies. We employed surveys to analyze 73 responses. Research revealed that Netflix's consumers were only partially aware of the Netflix household policy change. We found that following this policy change consumers' trust in the brand had somewhat declined and that overall respondents' attitudes toward Netflix following the policy change were somewhat negative. Although trust and attitude shifts towards Netflix declined, research on subscription continuation showed that most users would continue to have a Netflix subscription in the future. These findings result in consumer attitudes toward the password-sharing policy are closely connected to their trust in Netflix and their likelihood of continuing their subscription. If users view the policy negatively, it may reduce trust and weaken their engagement with the platform. This highlights the importance of company policies in shaping consumer relationships and subscription decisions.

#081 - Brown, Michelle

Major: Chemical Engineering - Bachelor of Science
Faculty Research Mentor: Prajwal Mohanmurthy, Physics & Astronomy
Funding: None | **Project Category:** Physical Sciences

Transportation of Trapped Atoms Using MOT-ODT Trap Geometries
Efficient transfer of cold molecules from a magneto-optical trap (MOT) into an optical dipole trap (ODT) is a key step toward precision measurements and quantum control of molecular systems. Traditional approaches often rely on an intermediate "bus" ODT to enhance loading efficiency, but this adds experimental complexity and optical power requirements as well as additional funding requirements. In this work, I investigated the feasibility of directly loading molecules from a MOT into a single, standing-wave ODT without the use of a bus ODT, using numerical simulations using the code framework of Atom ECS. The molecular phase-space dynamics during the MOT–ODT transfer are simulated, incorporating realistic trap potentials, scattering forces, and thermal distributions. The simulations explore the dependence of loading efficiency on ODT beam waist, trap depth, detuning, and spatial overlap between the MOT and ODT. While the theoretical framework for this transfer has been established in previous works, the experimental feasibility is what this research sets out to provide. Transfer from one trap to another is one of the biggest sources of atom loss in many cold atom experiments. Reducing the number of transfers from two to one could greatly improve atom retention in experiments.

#202 - Brown, Taylor

Major: Forestry - Bachelor of Science
Faculty Research Mentor: Kristy McAndrew, FWRC - Forestry
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Testing the diet breadth of the baldcypress leafroller (Archips goyerana): Implications for southeastern forests
The baldcypress leafroller (Archips goyerana) is a native lepidopteran defoliator that is considered monophagous on bald cypress (Taxodium distichum) and pond cypress (Taxodium ascendens), despite the majority of species in the Archips genus being generalist herbivores. In recent decades, the observed number of outbreaks has increased, and

its ecological and economic significance has become a concern. Repeated defoliation can reduce radial growth, deplete stored carbohydrate reserves, increase vulnerability to environmental stressors, and in severe or consecutive years, contribute to canopy dieback and mortality. These health concerns have prompted interest in determining the host breadth of the species through experimental means, especially considering vulnerable species such as Atlantic white cedar (Chamaecyparis thyoides), which co-occurs with bald cypress in parts of its range. Here, we fed individual baldcypress leafroller larvae plant species from the Cupressaceae family to determine if the moth has additional suitable hosts. Larvae were hatched and maintained in the lab and assessed daily to determine whether hosts other than baldcypress impacted i) survival, ii) growth rate, and iii) pupation success. Survival and growth metrics serve as indicators of host suitability for baldcypress leafroller. Determining whether this species is truly monophagous will improve predictions of forest susceptibility and potential range expansion

#203 - Bryan, Sadie

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Shien Lu, Agricultural Science & Plant Protec
Co-Author(s): Lindsey Robinson, Ehtasham Ali, Dan Jeffers
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evaluation of Antifungal Activity of MS455 and Other Isolates Against the Fumonisin Toxin Producer Fusarium Verticillioides

Fusarium ear rot is one of the most common diseases of corn, and *Fusarium verticillioides* is the fungal species most frequently associated with this disease. A notable feature of *F. verticillioides* is its ability to produce the mycotoxins fumonisins (FB_1, FB_2, FB_3, and FB_4), which pose significant health risks to humans and animals. The endophytic bacterium MS455, isolated from a soybean plant, exhibits antifungal activity against a range of plant fungal and bacterial pathogens. Previous studies have shown that the *ocf* gene cluster, responsible for the production of the antifungal compound occidiofungin, is a key genetic determinant of this activity. The objectives of this research are to characterize the antifungal activity of MS455 against the ear rot pathogen and to identify additional bacterial isolates with antimicrobial properties. Preliminary bioassays revealed that MS455 and several other bacterial isolates inhibit *F. verticillioides*. Quantitative plate assays demonstrated that a mutant of an *ocf* homologous gene lost antifungal activity, whereas the wild-type MS455 strain retained strong inhibition of the pathogen. Additional MS455 mutants are currently being evaluated. The antifungal activities of the newly identified bacterial isolates are also being tested, and their taxonomic identities are being determined through the analyses of housekeeping genes. This research will contribute to the development of biological control agents aimed at reducing FB contamination in agricultural products.

#005 - Buchanan, Andrew

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Qingqing Liu, Mechanical Engineering
Funding: None | **Project Category:** Engineering

Investigation of the effects of Non-Condensable Gas on Molten Salt Heat Transfer to Support MSR Development

This research investigates the effects of non-condensable gases (NCGs) on molten-salt heat transfer to support the development of advanced Molten Salt Reactors (MSRs). MSRs are promising due to their inherent safety, high thermal efficiency, and sustainable fuel utilization. However, the presence of NCGs, originating from fission products, dissolved gas release, or thermal decomposition, introduces significant uncertainties in heat transfer and flow behavior. Even trace concentrations of NCGs can alter thermophysical properties, disrupt convective patterns, and reduce heat removal efficiency. Despite their importance, NCG effects have not been adequately represented in current thermal-hydraulic correlations, limiting the predictive capability of MSR design tools. To address this gap, the project employs Computational Fluid Dynamics (CFD) simulations in ANSYS Fluent to investigate the influence of NCGs on molten-salt heat transfer. The study focuses on identifying the relationship between NCG concentration, void fraction, flow

regime, and local wall heat-transfer coefficients under MSR operating conditions. Thermophysical properties of multiple gas species are incorporated into the model to evaluate how molecular diffusivity, gas solubility, and density ratios affect the overall heat-transfer process. Simulation results will be compared with established empirical and semi-empirical correlations to evaluate their applicability and limitations in predicting molten-salt heat transfer in the presence of NCGs. The comparison will guide the development of modified correlations that account for gas-phase effects, such as reduced thermal conductivity and interfacial resistance caused by dispersed bubbles or gas films. The expected outcomes include quantifying heat transfer degradation due to NCG accumulation, identifying key dimensionless parameters that govern the transition from single-phase to two-phase flow, and formulating correction factors for conventional correlations. The resulting database and models will enhance the fidelity of system-level MSR simulations, improve safety margins, and inform operational strategies for gas management. Beyond MSR applications, the findings will benefit broader areas affected by multiphase heat transfer.

#204 - Buck, Martin

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Cooper Brookshire, CVM Clinical Science Department
Co-Author(s): Khadija Ferdous, Joo Youn Park, Keun Seok Seo
Funding: NIGMS of the National Institutes of Health | **Project Category:** Biological and Life Sciences

***In Vitro* Comparison of Cloxacillin and Dicloxacillin as Inhibitors of ESBL and AmpC β-Lactamases in Enterobacterales**

Dicloxacillin (diclox) is a β-lactam that is widely available for clinical use in both human and veterinary medicine. It is structurally similar to cloxacillin (clox) which is used to differentiate extended spectrum β-lactamase producing (ESBL) and AmpC β-lactamase producing Enterobacterales by inhibiting the AmpC phenotype but not ESBLs. However, clox has little clinical application. The aims of this study are to determine if diclox demonstrates equivalent *in vitro* activity to clox as an inhibitor AmpC β-lactamase enzymes and if diclox has activity as inhibitor of ESBL enzymes. This was tested by performing modified Kirby-Bauer disk methods on veterinary Enterobacterales isolates using Clinical Laboratory Standards Institute breakpoint guidelines. Reversing resistance was classified as those that regained susceptibility to CPD and FOX with the addition of diclox or clox. Findings indicate that diclox shows comparable *in vitro* activity to clox in reversing resistance among various species and phenotypes of Enterobacterales, including AmpC and some ESBL producing strains. This supports further investigation into the clinical utility of diclox as a β-lactamase inhibitor in combination therapy for multidrug-resistant Gram-negative infections.

#006 - Budhathoki, Prabin

Major: Computer Engineering - Bachelor of Science
Faculty Research Mentor: Christopher Hudson, Computer Science and Engineering
Co-Author(s): Daniel Carruth
Funding: Volunteer | **Project Category:** Engineering

Development of a Multi-Axle Autonomous RC Truck Testbed with LiDAR-Based Perception

Autonomous vehicle research requires reliable experimental platforms to evaluate sensing, perception, and control algorithms in real-world conditions. This ongoing project focuses on the development of a scaled multi-axle truck platform designed to support future research on vehicle autonomy and control. The platform is based on a modified commercial RC truck chassis that has been assembled and adapted to support external actuation and autonomous operation. A custom control interface is being developed to translate commands from an autonomy software stack into steering and throttle signals for the vehicle. The system operates using the Robot Operating System 2 (ROS2) framework, enabling communication between perception, control, and hardware subsystems. An onboard embedded computing platform manages sensor processing and vehicle navigation tasks. To support environmental perception, a LiDAR sensor has been integrated for obstacle detection, and its performance is being evaluated in comparison with data obtained from a depth-sensing camera. The resulting platform serves as an evolving autonomous vehicle testbed capable of supporting research on steering behavior, multi-axle vehicle dynamics, and obstacle detection. This work establishes a scalable hardware and software foundation for future studies in path tracking, articulation effects, and advanced control algorithms for autonomous ground vehicles.

#007 - Burcham, Ella

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: David Van Den Heever, Ag & Bio Engineering
Co-Author(s): Zack Murphy, Naima Bradley
Funding: None | **Project Category:** Engineering

Effects of Creatine on Emotional Processing

Creatine monohydrate is widely known for improving skeletal muscle performance, but its effects on brain function are less researched. Creatine helps cells regenerate adenosine triphosphate (ATP) through the phosphocreatine-creatine kinase system, which supports rapid neuronal activity and communication between brain cells (Wyss & Kaddurah-Daouk, 2000). Cognitive processes sch as emotional face recognition and semantic understanding require substantial energy and involve multiple brain regions. Because these processes depend on efficient neural activity, creatine supplementation may influence how the brain responds during cognitively demanding tasks (Verosky et al., 2020). The objective of this study is to examine whether neural responses involved in emotional and semantic processing can be measured using frequency-tagged electroencephalography (EEG) in the context of creatine supplementation. To examine this relationship, Fast Periodic Visual Stimulation (FPVS) was combined with EEG to measure frequency-locked neural responses during emotional face recognition, word recognition, and memory-related processing tasks. This methodology produces reliable neural signals that can be detected in individual participants in less than two minutes of recording time (Rossion et al., 2015). Participants viewed rapidly presented streams of visual stimuli while EEG activity was recorded, and signal-to-noise ratio (SNR) was extracted from occipital and parieto-occipital regions associated with visual recognition processes. Preliminary results demonstrated reliable neural entrainment at the 6 Hz stimulation frequency across task conditions, with particularly strong responses observed during word recognition and emotional face processing. Statistical power is currently limited due to the small sample size; however, preliminary trends indicate that the experimental paradigm reliably elicits neural responses associated with high-level visual and cognitive processing. Data collection is ongoing, and future analyses will evaluate the potential influence of creatine supplementation on these neural responses.

#115 - Burke, Bradley

Major: Secondary Education - Bachelor of Science
Faculty Research Mentor: Christian Flow, History
Funding: None | **Project Category:** Humanities

Swineherds and Centrality: How Eumaeus Relates to Odysseus

The Odyssey has remained in the realm of literary, philosophical, and historical discussions for thousands of years, and is one of the most well-known and often referenced pieces of epic poetry. While there have been countless works created about the Odyssey there is still plenty to discover about Homer's epic tale. My research is an exploration of the character Eumaeus and specifically how he relates to Odysseus himself. Eumaeus stands out as the only character addressed in the second person by the bard, which highlights his significance. After noting this significance, it became evident that in the poem Eumaeus the loyal swineherd shares many qualities with the hero Odysseus. They have connections with the bards, with Telemachus, and with each other, proving there is much to be uncovered. By examining the text itself and consulting various authoritative commentaries I seek to further understand and explain Eumaeus' relation to Odysseus. Understanding the way a faithful swineherd relates or even mirrors the great hero Odysseus is central to the way the epic poem should be interpreted and applied in modern day discussions of literature and philosophy.

#205 - Burnett, Maggie

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Nicole Ashpole, Department of Comparative Biological Science

Co-Author(s): Taylor Shamblin, Eliana Carter, Maximus Smithey, Sadie McCoy, Kristine Willet
Funding: NIH | **Project Category:** Biological and Life Sciences

COMPARING MORPHOLOGICAL EFFECTS OF MINOR ENDOCANNABINOID PATHWAYS IN ZEBRAFISH
Cannabinoid usage and availability have grown substantially in recent years. This rise in use has called demands greater safety regulations which have yet to be implemented. As a result of lacking safety guidelines and an increase in accessibility, pregnant women and developing fetuses are at greater risk of exposure. Our prior research has shown that major cannabis constituents like Δ9-tetrahydrocannabinol (THC) and cannabidiol (CBD) can alter larval zebrafish development and morphology. We are now studying these developmental and morphological outcomes of minor cannabinoids in zebrafish. We hypothesize that six minor cannabinoids (CBG, CBN, Δ10-THC, Δ8-THC, Δ9-THC, and CBD) cause morphological changes of the spine and tail as well as pericardial and yolk sac edema, and that these effects are mediated by two major endocannabinoid receptors: CB2 and CB1. To test the hypothesis, wild type, CB1 (cnr1) and CB2 (cnr2) knock-outs were exposed to six different concentrations of cannabinoids (0-2 μm). Each exposure lasted from 6-96 hours post fertilization. The larvae were then imaged, and morphology was scored. Several cannabinoids induced dose-dependent toxicities in wild-type zebrafish. Interestingly, cannabinoid receptor knock-outs show increased morphological abnormalities even in the absence of cannabinoid exposure. Certain cannabinoids increased these toxicities further; Δ8-THC and CBD caused significant increases in yolk sac edema in both CB1 and CB2 knockouts. Δ9-THC increased yolk sac edema in CB2 knockouts. There was a significant increase of tail curvature in CBD in CB2 knockouts. In conclusion, most cannabinoids induce morphological abnormalities in developing zebrafish. The interpretation of mechanism of toxicity for several cannabinoids was impacted by increased susceptibility to toxicity within the knock-outs. However, we see evidence that CBD, CBG, Δ9-THC, Δ8 -THC, and Δ10-THC utilize canonical cannabinoid receptors to modulate morphological development.

#206 - Camp, Kamry
Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Clay Cavinder, Animal & Dairy Science
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Neurologic activation in adults as a result of hands-on activity with horses and virtual reality experience
Equine-based activities present a unique, non-pharmacological intervention for improving human mental and physical health as well as social skills and skills pertaining to independent functioning. At this time, it is largely unknown to what degree experiencing horses through the means of virtual reality (VR) may offer comparable health-related outcomes as experiencing live horses. It is also unknown exactly how interacting with horses—whether in person or through VR—impacts adults at the neurological level. Uncovering how humans process interaction with horses, whether the stimuli is of actual or virtual form, is of great value to the agricultural and therapeutic industries, particularly equine-assisted services. In one study using a VR-based equine activity, short-term improvement to general well-being and perceived stress was demonstrated through significant reductions in self-reported perceived stress scores and positive impacts on overall mood. Therefore, VR may be a viable alternative to live horses in accessing the benefits of equine-related activities without the associated time, cost, and labor typically required either personally or systematically to access them. Further, if VR is a comparative option for equine-based activities offering positive outcomes, it could be an avenue to enhance the lives of people who will not otherwise have access to equine-based activities. Therefore, our study will explore neurological activity of participants working with a live horse and experiencing a horse-related activity through VR. Specific questions that will be answered include:
· What regions of the brain are most activated during interaction with horses in person versus interaction with horses through VR, and at what level is the activation (as suggested by wave type)? · How does the experience of equine-based activities, whether occurring in person or through VR, influence outcomes related to physical health, such as handgrip strength and static balance?

#008 - Carpenter, Haley
Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: David Van Den Heever, Ag & Bio Engineering

Co-Author(s): Zack Murphy, Ann Lauren Schmidt, Sophia Lindsey
Funding: ORED Undergrad Research Program, Advancing Collaborative Research | **Project Category:** Engineering

Mapping Adolescent Emotional Reactivity and Risk for Depression and Anxiety Using Fast Periodic Visual Stimulation
Adolescence is a developmental period characterized by heightened emotional reactivity and increased vulnerability to anxiety and depression. Better understanding how teenagers' brains respond to emotional information can lead to more accurate methods of identifying early warning signs and improvement of prevention efforts. This study explores the feasibility of using fast periodic visual stimulation (FPVS) combined with electroencephalography (EEG) to measure how adolescents process different emotions. Teens ages 13–15 completed standardized questionnaires about anxiety, depression, and recent life stress before participating in a brain-recording session (n=28). During the session, EEG was used, a noninvasive method that measures brain activity from sensors placed on the scalp. Participants viewed a rapid stream of similar facial expressions, with oddball images (such as an angry expression) appearing at regular intervals. Preliminary results indicated differences in brain responses depending on the type of emotion shown. The scenario with a stream of neutral faces and a happy face as the 'oddball' shows a preliminary condition separation in the Left Occipitotemporal region of interest (p=0.01). Importantly, teens with higher anxiety levels showed stronger brain responses to angry faces compared to teens with lower anxiety. These findings align with the common theory of Attentional Bias to Threat (ABT), suggesting that anxiety is associated with heightened sensitivity to deemed threats. The results thus far suggest that this fast, standardized EEG method can be used in the future to detect emotion-related brain differences linked to anxiety in adolescents. With further research in larger samples, this approach could contribute to the development of brief, objective screening tools to support early identification of emotional health risks in young people.

#207 - Caudill, Alana

Major: Landscape Architecture - Bachelor of Landscape Arch
Faculty Research Mentor: Guihong Bi, Plant and Soil Sciences
Co-Author(s): Taylor Blaise, Pawel Orlinski, Tongyin Li
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evaluation of Novel Melon Varieties in Mississippi
Melons, including watermelon, cantaloupe, and honeydew, are important specialty crops in Mississippi due to their flavor, nutritional benefits, and strong market demand. While many new cultivars offer improved yield, fruit quality, and disease resistance, limited research has evaluated their performance under the state's hot, humid conditions. This study assessed 33 watermelon and 17 melon cultivars for plant growth, yield, and fruit quality traits, including single melon weight, number of melons per plant, soluble solids (°Brix), firmness, and rind thickness. Preliminary results showed significant variation among cultivars. For melons, cultivar 'Banana' produced the heaviest fruit (~9 lb), while 'Kiku Chrysanthemum', 'Ginkaku', 'Sakatas Sweet', and 'Japanese Tiger' were smallest (~1 lb), with most cultivars ranging 4–6 lb. 'Ginkaku' had the highest soluble solids (~15 °Brix), and firmness was greatest in 'Ginkaku' and 'Banana'. 'Kiku Chrysanthemum' and 'Ginkaku' also produced the most fruits per plant. For watermelons, 'Orangealo PL' and 'Tendersweet' produced the largest fruits (~28 lb), while 'Lemon Drop' 'Kaho', and 'Ocelot' were smallest (~5 lb). 'Ocelot' and 'Century Star' had the highest soluble solids (~12 °Brix), while 'Silver Yamato' was lowest. 'Kaho' and 'Lemon Drop' produceed the most fruits per plant. Rind thickness was greatest in 'Jubilee' and 'Orangealo PL' and lowest in 'Kaho' and 'Lemon Drop'. These results provide valuable information for Mississippi growers in selecting melon and watermelon cultivars that optimize yield and fruit quality under local growing conditions.

#208 - Chaffins, Benjamin

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Sandra Correa, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Hunter Huddleston, Beth Peterman, Peter Allen, Sandra Correa
Funding: CFR URSP | **Project Category:** Biological and Life Sciences

Environmental influences on the body condition and reproductive cycles of two minnow species across different habitats in the Pascagoula drainage.
The Pascagoula River is the last river in the United States with largely unaltered hydrology. Spring flood pulses allow larval and mature fish to utilize the floodplain for spawning, refugia, and foraging. We compared two Leuciscid species that utilize different habitat types within the Pascagoula watershed. Alburnops baileyi (Rough-shiner) is largely restricted to first- and second-order streams. Notropis maculatus (Taillight-shiner) is commonly detected in floodplains. We sampled A. baileyi (by seining) in small tributaries in the upper Pascagoula and N. maculatus (with fyke nets) in the floodplain of the lower Pascagoula. We analyzed 186 fishes (A. baileyi: n=116, N. maculatus: n=70). 36 individuals were used for histological analysis (A. baileyi: n=22, N. maculatus: n=14). We implemented separate regression models of Gonadal Somatic Index (GSI), body condition, or fecundity (of mature gravid females), as a function of month, and fecundity as a function of body condition. We also modeled the probability of reproduction (in individuals with mean GSI>0) by month. April was the only month in which both species were sampled. We found interspecific differences in body condition and GSI with higher April values in A. baileyi than N. maculatus. While A. baileyi's body condition remained stable from April to May, it declined for N. maculatus from April to June. Alburnops baileyi mean GSI decreased from April to May, while it remained stable in N. maculatus from April to June. In April, the probability of reproduction was higher in A. baileyi than N. maculatus. No detectable month effect on the probability of reproduction was found within either species. Among reproductive individuals, N. maculatus exhibited higher fecundity than A. baileyi, while body condition showed a weak positive influence, and month effects were not supported. Findings suggest that A. baileyi are reproductively active during the months sampled and reproduce earlier than N. maculatus.

#209 - Chapman, Caroline

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Dr. Santiago Cornejo, Animal and Dairy Science
Co-Author(s): Santiago Cornejo, Maghan Taylor, Leyla Rios
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Application of Thoracic Ultrasound for Identifying Subclinical Respiratory Disease in Goats enrolled in a Buck Performance Test
Respiratory disease is a leading cause of performance loss in livestock, resulting in economic losses for producers; yet, subclinical cases often go undetected using traditional clinical scoring methods. The objective of the descriptive study was to assess the feasibility of thoracic ultrasound (TUS) for detecting subclinical respiratory disease in goats enrolled in the Mississippi buck test program. Although TUS has been validated for identifying subclinical respiratory disease in calves, its application in goats has not been established. Establishing the utility of this technique in goats is critical for improving early disease detection. We hypothesized that thoracic ultrasound would be a useful diagnostic tool to detect subclinical respiratory disease in goats. Goats (n=30) from 5 different states enrolled in the 2025 MSU Southeastern buck test at the H.H. Leveck Animal Research Center. At enrollment, each animal underwent a health check and was confined for two weeks. Thoracic ultrasound examinations were conducted at enrollment and on a weekly basis for the remainder of the 84-day test using a portable ultrasound unit equipped with a linear probe. Lung lesions were scored based on the presence of consolidations greater than or equal to 1 cm. Nasal swabs were collected upon arrival and when animals showed a lung score consistent with subclinical pneumonia. Animals were treated with Draxxin (tulathromycin) at a dose of 2.5 mg/kg administered intramuscularly. Of the 30 bucks evaluated, 87% (26/30) had subclinical pneumonia. By D14, the cumulative incidence had reached 77%, and by D42, 87% of the population had been affected. Overall treatment response to Draxxin was 92%, with improvements evident within 7-14 days post treatment. TUS detected lung consolidations that were not visible through clinical signs, showing its potential as a valuable tool in small ruminant health management. Overall, these findings provide small ruminant producers as diagnostic approach similar to those used in cattle, strengthening goat health management nationwide.

#009 - Chaudhary, Piyush

Major: Mathematics - Bachelor of Science

Faculty Research Mentor: Dong Chen, Ag & Bio Engineering
Funding: Shackouls Honors College Research Fellowship, BCoE Undergrad Research | **Project Category:** Engineering

General-Purpose Vision System for Autonomous Robot Perception and Navigation
Autonomous robots operating in real-world require perception systems capable of recognizing diverse objects and environments without the need for extensive retraining. Traditional computer vision applications rely on task-specific model leveraging and trained on large, labelled dataset and are difficult to adapt to new environments outside what it was trained for. This project presents to development of general-purpose computer vision system designed to enable flexible perception and navigation for robots. This system incorporates a multi-model approach integrating face recognition and object detection using textual-description or reference image. The perception system allows the robot to identify and detect previously unseen people or objects by using prompt-driven detection methods. Objects can be described using natural language (e.g. "red toolbox") or by providing a reference image (works for face recognition as well). This enables detection even when the target appears in a different orientation, lighting conditions, or visual styles. This capability allows the system to generalize beyond the fixed datasets and can now operate effectively in dynamic environments. The vision system is deployed on a Unitree Go2 Pro quadruped robot which acts as a real-time perception system on the mobile robot. Detected objects and semantic information are integrated with a simultaneous localization and mapping (SLAM) system. This can allow the robot to associate visual detection with spatial location in its environment which enables the robot to be capable of performing prompt-driven navigation tasks such as locating specific objects, avoiding obstacles, or moving toward targets defined by visual or textual cues. This work demonstrates how vision models can be integrated with robotic navigation systems to create flexible and adaptable perception system for autonomous platforms without requiring retraining.

#082 - Chen, Christopher
Major: Chemistry - Bachelor of Science
University: Mississippi School for Math and Science
Faculty Research Mentor: Keith Hollis, Chemistry
Co-Author(s): Samuel Juarez Escamilla
Funding: MSMS-MSU Research Program | **Project Category:** Physical Sciences

Study of photochemical activation of a borrowing-hydrogen reaction with a Mn carbonyl complex
Despite C-C and C-N coupling reactions being the framework of organic synthesis, the development of methods for their catalysis has presented a challenge. The borrowing-hydrogen reaction has relied on precious transition metals such as Ru and Pd, prompting researchers to explore alternative metals. Our group has explored the catalytic activity of a Mn carbonyl complex, which is an earth abundant and cost effective transition metal. An underexplored modification to the borrowing-hydrogen reaction is the use of light to activate the metal catalyst. Usually, high temperatures are needed for the dissociation of the ligands around the metal to start the reaction. With light, the ligands may dissociate at lower temperatures and accommodate reactions with more temperature-sensitive substrates. In our work, we explore the potential of our Mn catalyst to be a photochemically activated and react in borrowing-hydrogen reactions.

#010 - Chen, Devin
Major: Cybersecurity - Bachelor of Science
Faculty Research Mentor: Christopher Hudson, Computer Science and Engineering
Co-Author(s): Daniel Carruth
Funding: None | **Project Category:** Engineering

Development of a Cross-Version ROS Mobile Robotics Platform for Autonomous Mapping and Navigation
This work presents the development and evaluation of a mobile robotics platform based on a Kobuki-driven TurtleBot2 for autonomous mapping and navigation. The system leverages both ROS1 and ROS2 to combine stable legacy hardware support with modern navigation capabilities. To enable interoperability between the two ecosystems, a ROS1–ROS2 bridging mechanism was implemented, allowing sensor data and motion commands to be

exchanged seamlessly across system components. This approach preserves compatibility with existing ROS1 drivers while enabling integration with contemporary ROS2-based SLAM and navigation frameworks. The robot performs simultaneous localization and mapping (SLAM) to construct occupancy grid maps of unknown indoor environments and supports autonomous navigation behaviors including obstacle avoidance and goal-directed movement. The modular system architecture allows perception, mapping, and control components to operate cohesively despite differing middleware versions. Experimental evaluation was conducted in structured indoor settings to assess mapping consistency, navigation stability, and overall system responsiveness. Results demonstrate that cross-version integration provides a practical pathway for extending the lifespan of legacy robotic platforms while benefiting from advancements in modern robotic software frameworks. This work establishes a scalable foundation for future research in autonomous navigation, system migration strategies, and hybrid ROS architectures.

#011 - Chunn, Hunter

Major: Chemical Engineering - Bachelor of Science
Faculty Research Mentor: Julie Jessop, Chemical Engineering
Co-Author(s): Finnis Ginder, Sage Schissel, Julie Jessop
Funding: None | **Project Category:** Engineering

Spiked for Success: Validating Pyrene as an External Reference for Raman Spectroscopy

Acrylates are an industrially significant group of polymers with wide applications in coatings, textiles, and cosmetics. The presence of a C-C double bond located adjacent to a carbonyl makes acrylates highly reactive, especially in radical reactions. Electron-beam (EB) polymerization is a radiation polymerization method in which accelerated electrons are used to form radicals on the monomer species. EB is advantageous compared to other methods of polymerization in that it does not require the use of volatile solvents or free-radical initiators. However, EB results in indiscriminate hydrogen abstraction, eliminating the usefulness of common reference peaks used in Raman spectroscopy for conversion measurements in these systems. Thus, to calculate conversion in EB-polymerized systems using Raman spectroscopy, a highly stable reference group such as an aromatic ring is required. However, most industrially relevant acrylates, such as tri-methyl propyl triacrylate (TMPTA) and iso-bornyl acrylate (IBOA), lack phenyl groups. In such systems, an external reference molecule could be added to a reaction mixture, providing a stable reference group for conversion calculations. This work aims at validating pyrene as an external reference for conversion calculations in EB-polymerized systems using Raman spectroscopy. Pyrene was selected as an external reference due to its high aromaticity, distinct Raman peaks, and solubility in acrylate monomers. First, a neat calibration curve was created by dissolving varying amounts of polystyrene in styrene and calculating “conversion” via the system’s internal reference of the pendant aromatic ring. The feasibility of using the aromatic ring in styrene as a reference structure has been verified in previous work. This neat calibration curve was then compared to a pyrene-spiked calibration curve, in which the external pyrene reference was used for “conversion” calculations. Both calibration curves yielded similar “conversion” results. After validating that pyrene could be used in a non-reactive system that simulates polymerization, pyrene was added to TMPTA formulations undergoing thermal polymerization with the free-radical initiator AIBN. The pyrene external reference yielded similar conversion results compared to a neat system using the internal reference under a given set of reaction conditions. However, even though similar final conversions were achieved, pyrene affected the reaction time of the system, requiring further study of pyrene’s impact on reaction kinetics.

#210 - Clay, Kelsey

Major: Biological Sciences - Bachelor of Science
Faculty Research Mentor: Christopher Brooks, Biological Sciences
Co-Author(s): Eric Ahiadu, Christopher Brooks, Eric Ahiadu
Funding: None | **Project Category:** Biological and Life Sciences

Buruli Ulcer Transmission Dynamics
Buruli ulcer (BU), caused by *Mycobacterium ulcerans*, is a neglected tropical disease endemic to West Africa whose transmission mechanism remains unclear. Epidemiological evidence suggests associations with mosquito vectors, vertebrate reservoirs, and environmental contamination, such as shared water sources; however, the relative importance of these pathways to sustained transmission is unknown. The objective of this study is to construct and analyze a deterministic, ordinary differential equation, multi-host model to evaluate competing hypotheses of BU dynamics. We developed a system of nonlinear differential equations incorporating human SEIR compartments, mosquito vector populations, a vertebrate reservoir host, and an environmental fomite compartment representing water. Logistic growth terms were included for vector and reservoir populations, and reinfection dynamics were incorporated to account for potential immunity loss. Transmission parameters were structured to distinguish vector-mediated, reservoir-mediated, and environmentally mediated exposure routes. The model framework enables derivation of the basic reproduction number (R_0), characterization of disease-free and endemic equilibria, and assessment of stability conditions. Sensitivity analyses are used to identify parameters that most strongly influence persistence of BU in endemic communities. Clarifying the dominant drivers of BU transmission will inform whether environmental sanitation efforts alone are sufficient for control, or whether vector and reservoir management must also be considered.

#012 - Coleman, Eli

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Vivek Khare, Aerospace Engineering
Co-Author(s): David Wallace, Jacob Walker, Joseph Nevels, Luke Jordan
Funding: Presidential Endowed Scholarship | **Project Category:** Engineering

Lunar Dust Mitigation
The creation of the Artemis Program has brought back the potential for manned missions to the lunar surface. While the current plan is to reestablish human presence on the moon in 2027, there are still many issues NASA must tackle before developing long-term settlements. One such issue is the abrasive lunar regolith that is attracted to structures and equipment. With the moon lacking a magnetosphere, the dust on the surface becomes charged by solar winds and ultraviolet radiation. These charged particles can cause optical interference, doped oxygen lines, and harmful abrasion with overall structures and machinery. Approaches to dust mitigation include both active and passive systems. Active systems require power to repel the lunar regolith, while passive systems rely on dissipative coatings. The dissipative coatings selected for this project do not require power, making it more ideal for mitigating dust accumulation on general structural surfaces. The passive methodology describes an approach that focuses on absorbing the charge associated with that regolith through means of conduction across a conductive material layer. These materials include an Indium Tin Oxide-coated Aluminized Kapton film attached to a structural surface with a durable two-component epoxy and a silicon carbide wafer also attached using a conductive adhesive. All materials used provide conductive characteristics, allowing for charges associated with regolith to pass through the system. This interaction negates the electromagnetic force that adheres the regolith to the structural surface, allowing for the regolith to be easily removed without substantial damage to the structure. Furthermore, the researchers are reinforcing the integrity of their models by seeking out research revolving charges propagated through materials as well as advanced Maxwell equation calculations.

#013 - Coltharp, Steven

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Vivek Khare, Aerospace Engineering
Funding: None | **Project Category:** Engineering

Launch Vibration Control in Deployable Bistable Composite Tape Springs
Deployable space structures used in solar and deep-space missions are typically stowed in a compact configuration within a satellite launch vehicle. These bistable composite structures store elastic strain energy, allowing them to self-deploy once released in orbit. During launch, the intense thrust and resulting vibrations generated by rocket engines

may cause interlayer slip within the coiled deployable structures, leading to partial or uncontrolled deployment and potential structural damage. The radial contact pressure generated by coiling pretension can provide interlayer frictional resistance to slip. This study investigates the influence of launch-induced vibrations on the structural stability of bistable composite tape springs. Linear frequency analyses are conducted for both untensioned and pretensioned coiled configurations to identify critical excitation frequencies. To mitigate vibrational slip and associated damage, the integration of hyper-viscoelastic damping materials into the coilable tape spring hubs is explored. The effectiveness of these damping-induced mitigation strategies will be assessed by comparing the amount of slip and displacement in the layers of the coiled tape spring against conventional pretension-only designs.

#131 - Connolly, Jason

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: ORED Undergraduate Research Program | **Project Category:** Social Sciences

Relation Between Maternal Warmth and Body Esteem Moderated by Media Influences on the Body

Monge-Rojas et al. (2025) did a study in Costa Rica to see how parenting style and meals influenced body self-late adolescents. The study found that authoritative parenting enhances late adolescent body appraisal and esteem. The authoritative style of parenting is known for its warmth and involvement which create the positive outcomes with said parenting style. Story et al. (2022) researched how the indirect effects of media body image messages and parent-child relationship quality on emerging adult body esteem through body image messages. It was found that there was a significant indirect effect of parent-child relationship quality and negative media body image messages on both male and female emerging adult body appraisal. Taylor and Armes (2024) researched the idea of social comparison through apps and its relationship with levels of self-esteem and body-esteem. They measured these variables through self-report questionnaires which elicited upward, downward, or no comparison responses. Results showed that self-esteem and body-esteem scores significantly increased after downward comparison on social media, with no change in scores following a neutral condition. Body-esteem scores significantly decreased after upward comparison on social media, while the self-esteem scores did not. Participants included 567 emerging adults who ranged in age from 18 to 22 years (M = 18.57, SD = 0.94). Participants reported on their gender (70.5% women, 27.3 % men) and race (70.7% White, 23.1% Black, 1.4% Asian or Asian American, 1.1% Latino, 1.6% other). The Body Esteem Scale for Adolescents and Adults (Mendelson et al., 2001) was used to measure satisfaction with body appearance. To measure maternal warmth, participants completed the Parental Bonding instrument (Parker et al., 1979). To measure body pressure from media, the Sociocultural Attitudes Toward Appearance Questionnaire-3 (Thompson et al., 2004) was used.
PROCESS 4.2 (Hayes, 2022) model 1 was used to conduct a moderation analysis. The model predicting body appearance satisfaction was significant, $R^2 = .29$, $F(3, 548) = 76.19$, $p < .001$. Maternal warmth was associated positively with body appearance satisfaction, $B = 0.15$, $SE = 0.05$, $p < .001$. Body pressure from media was associated negatively with body appearance satisfaction, $B = -0.55$, $SE = 0.04$, $p < .001$. The interaction between maternal warmth and body pressure from media was not significant, $B = 0.01$, $SE = 0.01$, $p = .37$.
This current study examined whether maternal warmth was related to body appraisal and how it was moderated by media influences on body appraisal. The results showed that maternal warmth was a significant positive predictor of body appraisal while media influence was a significant negative predictor of body appraisal. The interaction between maternal warmth and media influences on body appraisal was not significant.

#014 - Cook, Emma

Major: Chemical Engineering - Bachelor of Science
Faculty Research Mentor: Santanu Kundu, Chemical Engineering
Funding: None | **Project Category:** Engineering

Sustainable Material Design: The Effects of Calcium Ion Concentration on Alginate Fiber Formation
Production of petroleum-based plastics generates greenhouse gas emissions, and at the same time, these materials are largely nondegradable, contributing significantly to microplastic formation in both aquatic and terrestrial environments. As the market for plastic production expands alongside the growing global population, the need for sustainable alternatives becomes increasingly urgent. One promising alternative is alginate, an anionic polysaccharide naturally occurring in brown seaweed. Alginate has numerous unique applications in biomedical and engineering settings due to its ability to react with cations, such as calcium, to form polymer hydrogels. In this study, a 1% (w/v) alginate solution is considered. The alginate is rapidly extruded using a syringe into a beaker containing a calcium chloride solution. In the presence of calcium cations, the carboxylate groups of guluronic acids within alginate bind to the cations, forming a three-dimensional cross-linked structure that is insoluble in water. The formation and structure of the hydrogels were found to be highly dependent on the calcium ion concentration. At higher calcium concentrations, cross-linking occurs too quickly at the surface, encapsulating excess solution within the fiber, resulting in an inconsistent diameter throughout the fiber. In contrast, a more optimal calcium concentration produced fibers with more consistent diameters, which also correlated with increased fiber length.

#211 - Cooper, Alexa

Major: Data Science - Bachelor of Science
Faculty Research Mentor: Jonathan Barlow, Data Science
Funding: None | **Project Category:** Biological and Life Sciences

Medical ProCard: A Data-Driven Approach to Measuring Treatment Equity and Clinical Outcomes
Healthcare disparities continue to influence patient outcomes in the United States, particularly among women and historically marginalized racial and ethnic groups. Differences in diagnosis accuracy, pain management, maternal care, and access to advanced treatments are often linked to identity factors such as race, gender, ethnicity, and socioeconomic status. To address this issue, I am developing a Medical Performance Scorecard (ProCard) website designed to evaluate both the efficiency and equity of medical treatments across diverse populations. The ProCard system will collect and analyze treatment data categorized by identification factors including gender, sex, race, ethnicity, and other demographic variables. By comparing treatment types, recovery rates, complication rates, and long-term outcomes, the platform will measure overall effectiveness while identifying statistically significant differences in care. Data visualization dashboards will allow hospitals and healthcare administrators to detect patterns that may indicate inequities or systemic bias in treatment delivery. Beyond measuring clinical performance, the platform will serve as an accountability and quality-improvement tool. Providers can use the scorecard to assess whether new technologies, procedures, or protocols improve outcomes equitably across patient groups. By integrating data science, biomedical informatics, and ethical analysis, the ProCard aims to promote transparency and evidence-based decision-making in healthcare systems. This project combines technical innovation with a commitment to healthcare equity, transforming clinical data into actionable insights to help ensure consistent, unbiased, and high-quality care for all patients.

#106 - Cordova, Cristopher

Major: Kinesiology - Bachelor of Science
Faculty Research Mentor: Guillermo Oviedo, Department of Kinesiology
Co-Author(s): Vikaas Manjunath, Kya Davis, Ben Orr, Nathaniel Afirim
Funding: None | **Project Category:** Education

Functional Fitness Tests as Predictors of Cardiovascular Health in Mississippi College Students
Background: Pulse wave analysis (PWA) is related to arterial stiffness and is an accurate predictor of cardiovascular disease (CVD). Likewise, there is a correlation between decreased functional fitness (FF) and increased frailty as adults age. However, a gap exists in the literature discussing the associations between FF and PWA in younger populations. This study aimed to compare variables derived from PWA and analyze correlations to FF performance in university students in Mississippi. Methods: Eleven participants were recruited (6 females and 5 males; age = 24.75 ± 4.28 y.o.). PWA was performed using a non-invasive technique. FF variables were obtained by assessing the maximal isometric handgrip strength (HGS), and lower body strength (STST). Results: Males exhibited higher central pulse pressure (CPP) than females (42.20 ± 9.68 mmHg vs. 30.86 ± 4.49 mmHg; $p = 0.035$) and forward pulse height (FPH) than

females (32.80 ± 5.12 mmHg vs. 26.29 ± 2.69 mmHg; p = 0.028). HGS in females was lower than in males (22.83 ± 4.77 vs. 54.2 ± 79 kg; p = 0.017). HGS was correlated with CPP (ρ = 0.625, p = 0.039) and FPH (ρ = 0.684, p = 0.020). STST was correlated with central diastolic pressure (CDP) (ρ = 0.717, p = 0.012). Conclusion: In the present study, young males presented higher risks of CVD, as higher values of CPP and FPH are associated with potential damage to the cardiovascular system and end-organ structures. HGS for both sexes was average, which could compromise muscle function if they decrease. Interestingly, the positive correlation between PWA and FF parameters may be explained by increased muscular tone and greater sympathetic nervous system activation. Future studies with larger sample sizes are warranted to corroborate our results.

#132 - Cox, Brianna

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Co-Author(s): Juliana Medeiros
Funding: None | **Project Category:** Social Sciences

Paternal Mindful Parenting and Emerging Adult's Self Compassion: The Moderating Effect of Sociocultural Attitudes Toward Appearance

Mindful parenting has been identified as an important factor in youths' psychological adjustment. In one study by Mera et al. (2025), Australian youth completed surveys to report their parents use of mindful parenting as well as their own self-compassion, perceived stress, and mindfulness. This study found that perceived mindful parenting led to more mindfulness and self-compassion among youth. Additionally, Ranjouri et al. (2025) completed a preliminary investigation of components of self-compassion on psychological distress and wellbeing. Researchers found that self-compassion components, each in their own way, had significant relationships with participants psychological distress and wellbeing. Further research done by Eshak et al. (2020) with adolescent females explored the relationship between sociocultural factors and body dissatisfaction. This study found that sociocultural attitudes towards appearance were significant explanatory variables in low self-esteem. Participants included 1148 emerging adults who ranged in age from 18 to 29 years (M = 19.16, SD = 1.58). Participants reported their gender (68.1% women, 31.4% men) and race (75.5% White or European American, 16% Black or African American, 3.1% Multiracial, 2.9% Asian or Asian American). Participants completed the Mindfulness in Parenting Questionnaire (McCaffrey et al., 2017) to measure paternal mindful parenting. To measure self-compassion, the Self Compassion Scale (Neff, 2003) was completed by participants. For sociocultural attitudes towards appearance the Sociocultural Attitudes Towards Appearance Questionnaire (Schaefer et al., 2017) was completed by participants to measure general internalization. PROCESS 4.2 (Hayes, 2022) model 1 was used to conduct a moderation analysis. The model predicting self-compassion was significant, R^2 = .11, F(3, 1186) = 87.31, p < .001. Paternal mindful parenting was associated positively with self-compassion, B = .20, SE = .02, p < .001. General internalization of sociocultural attitudes toward appearance was associated negatively with self-compassion, B = -7.03, SE = 0.55, p < .001. The interaction between paternal mindful parenting and general internalization of sociocultural attitudes towards appearance was not significant, B= 0.04, SE – 0.03, p = .147. This study aimed to determine whether general internalization of sociocultural attitudes toward appearance moderates the relationship between paternal mindful parenting and young adult self-compassion. Results showed that paternal mindful parenting and general internalization were significant predictors of self-compassion. The interaction between paternal mindful parenting and general internalization was not significant.

#212 - Crowe, Elizabeth

Major: Kinesiology - Bachelor of Science
Faculty Research Mentor: Ben Wax, Department of Kinesiology
Co-Author(s): Maxwell Torrey, Peyton Horn, Leyton Riley, John Eric Smith, Zachary Gillen
Funding: None | **Project Category:** Biological and Life Sciences

The Effect of Concurrent Caffeine and Creatine Ingestion on Performance During a Repeated Bike Sprint Protocol

The ability to perform repeated bouts of high-intensity exercise under conditions of accumulated fatigue is an important part of training and competition. Creatine and caffeine are ergogenic aids that have been shown to improve exercise performance outcomes. The concurrent use of creatine and caffeine is common; however, its impact on performance is incompletely understood. This study examined the effect of caffeine and creatine on performance during a repeated bike sprint protocol, and its subjects included ten resistance-trained males. Following resistance exercise, a repeated, maximal-effort bike sprint protocol was performed under four separate conditions: placebo, caffeine, creatine, and creatine and caffeine concurrently. Primary bike sprint outcomes included peak power, mean power, and peak RPM. There was a significant increase in peak power from placebo to creatine ($p = 0.017$) and caffeine to creatine ($p = 0.035$). There were no significant differences across conditions for mean power ($p = 0.139$) or peak RPM ($p = 0.153$). Though the intervention conditions influenced peak power production across the repeated bike sprints, they did not meaningfully alter the progression of fatigue as there were no significant sprint x condition interactions for peak power ($p = 0.388$), mean power ($p = 0.151$), or peak RPM ($p = 0.083$). The results of the present study show that acute creatine supplementation may increase peak power production across repeated sprints; however, creatine, caffeine, or their concurrent use do not appear to slow the progression of fatigue or loss of power across sprints. This suggests a limitation for sprint performance benefits derived from creatine and caffeine under conditions of accumulated fatigue and shortened rest periods. Athletes may consider supplementing creatine to increase peak power production, but they must recognize that the fatiguing conditions of training and competition will strongly influence the magnitude of performance benefits derived from supplementation.

#015 - Cruz, Edward

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Eric Hansen, Computer Science and Engineering
Funding: BCoE UG Research Program AY 25-26 | **Project Category:** Engineering

Implementing and Evaluating a Generalized Variable Elimination Algorithm for Marginal MAP Inference

Many real-world decision problems require reasoning under uncertainty about hidden variables. Bayesian networks provide a widely used framework for representing uncertainty in artificial intelligence, and this project addresses an important inference problem for these models. This inference task is known as the marginal maximum a posteriori (marginal MAP) problem and arises in a wide range of applications, including real-time perception and path planning for autonomous vehicles, clinical decision support for disease diagnosis, and crop yield optimization in precision agriculture. Efficient algorithms for marginal MAP can help autonomous systems make robust and reliable decisions in complex, noisy environments. The algorithm studied in this project is a generalized variable elimination method that combines the classic variable elimination algorithm for Bayesian networks with value-iteration techniques used in partially observable Markov decision processes. By integrating these ideas, the algorithm can reason more effectively about hidden variables while allowing more flexible computational strategies. It also supports bounded-error approximation, enabling a trade-off between computational cost and solution quality when exact inference is too expensive. The project's contributions include improving the implementation of the algorithm and developing an accessible software package for public use. It also includes extensive experimental testing on a wide range of benchmark Bayesian networks to evaluate the algorithm's scalability and approximation behavior.

#133 - Dallager, Elijah

Major: Communication - Bachelor of Arts
Faculty Research Mentor: Zahed Arman, Communication
Co-Author(s): Claire Dillard, Destiny Hill
Funding: None | **Project Category:** Social Sciences

Public Relations Agency Adoption: Evidence from Business Leaders in Starkville

The Golden Triangle area of Mississippi (areas surrounding Starkville, Columbus, and West Point) attracted $5.9 billion in industry and investments from 2008 to 2018 (Camerota, 2018). Despite this growth, there are currently no professional public relations firms in the Golden Triangle area. This study investigated the potential adoption of a public relations firm in Starkville, MS, with a focus on understanding local business needs and market opportunities. For this study, we examined the perceived effectiveness of public relations services, including social media marketing, relationships with local businesses, and broader marketing strategies, while also considering how demographic factors influenced these perceptions and practices. We collected data through surveys from a range of local business owners, managers, and representatives in the Starkville area to better understand how they would utilize a public relations firm if one were available locally. We employed descriptive statistics and correlation analyses to examine and interpret the survey responses. Results from the survey revealed that food and beverage businesses were the most common, followed by service-based businesses, real estate and nonprofit organizations, retail/E-commerce, and Manufacturing, Healthcare/Wellness/Fitness, with Construction/Landscaping being the least frequent. These patterns suggest that boutique-style public relations services would be most effective in this market context. Data regarding media platform usage revealed that Instagram and TikTok are the most widely used platforms among these businesses. Overall, survey results indicated that local business employees, owners, and managers were only somewhat familiar with public relations services, suggesting a moderate level of awareness but limited depth of understanding. These findings indicate that establishing a public relations firm centered on offering boutique services would be the most effective strategy for entering the Starkville market.

#213 - Dalton, Dennis

Major: Forestry - Bachelor of Science
Faculty Research Mentor: Adam Polinko, FWRC - Forestry
Co-Author(s): Brian Lockhart, Andrew Ezell, Wayne Clatterbuck, John Hodges
Funding: CFR USRP | **Project Category:** Biological and Life Sciences

Comparing long-term stem survival and volume production of two hardwood species in pure and mixed-species stands in east-central Mississippi, USA.

Long-term stand development patterns in mixed-species, bottomland hardwood plantations remain poorly understood, thus limiting informed management decisions regarding afforestation methods in the Lower Mississippi Alluvial Valley (LMAV). This research continues a 44-year study of cherrybark oak (Quercus pagoda) and sweetgum (Liquidambar styraciflua) planted in 1992 in mixtures at three spacing arrangements: 2.4 m × 2.4 m (8 ft × 8 ft), 1.5 m × 1.5 m (5 ft × 5 ft), and 1.5 m × 1.5 m with double sweetgum rows. Two pure-species stands (i.e., pure sweetgum and pure cherrybark oak) were planted in 1983 at a 2.4 m × 2.4 m spacing to act as controls. Previous measurements through age 21 demonstrated that cherrybark oak eventually overtopped and outcompeted sweetgum despite initial height and diameter disadvantages. Current remeasurements at age 44 evaluate the long-term effects of interspecific and intraspecific competition on both individual tree and stand-level performance through changes in diameter at breast height (DBH), total height, stem survival, hardwood log grade, and volume production. Preliminary data indicate that cherrybark oak maintains dominance over sweetgum within all mixed spacing arrangements, with substantial differences in average DBH (e.g., 13.2 in versus 7.1 in) and average height (e.g., 90 ft versus 57 ft) favoring cherrybark oak. However, cumulative mortality is substantial in the closer spacings, with 50-68% mortality observed in the 1.5 m × 1.5 m arrangements compared to 19-26% in the wider 2.4 m spacing. Two pure-species stands (i.e., pure sweetgum and pure cherrybark oak) were planted in 1983 at a 2.4 m × 2.4 m spacing to act as controls. We predict cherrybark oaks planted in mixed-species stands at a 2.4 m × 2.4 m spacing will produce higher-quality stems, more merchantable volume, and improved vigor compared to single-species stands, while maintaining the highest survival rate. The results will inform planting density recommendations, species selection for hardwood plantations, and long-term management practices.

#090 - Davis, Emily

Major: Architecture - Bachelor of Architecture

Faculty Research Mentor: Alexis Gregory, School of Architecture
Funding: College of Architecture Art and Design Creative/REU | **Project Category:** Arts, Music, & Design

Designing Under Pressure: The Hidden Health Crisis in Architecture School
Architecture education is widely recognized for its demanding studio culture, long work hours, and high performance expectations. While this rigor is often framed as essential preparation for professional practice, it may also contribute to elevated levels of stress, burnout, and diminished well-being among students. This study investigates the physical, mental, and emotional health of students enrolled in architecture programs, with particular attention to workload, studio deadlines, critique environments, and sleep patterns. Using an anonymous survey distributed to architecture students across multiple academic levels, this research gathers both quantitative and qualitative data regarding stress levels, coping mechanisms, perceptions of faculty support, and overall well-being. The study aims to identify recurring stressors within architectural education and examine how studio culture influences student health outcomes. By analyzing patterns in student responses, this research seeks to contribute to ongoing conversations about academic rigor, work-life balance, and institutional responsibility within design education. Ultimately, the findings may inform recommendations for improving support systems, engaging in a healthier studio environment, and promoting sustainable academic practices within architecture schools.

#214 - Dawe, Jeremy

Major: Data Science - Bachelor of Science
Faculty Research Mentor: Jean-Francois Gout, Biological Sciences
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Biological and Life Sciences

Investigating Mutational Signatures of Transcription Coupled Repair in Cancer
Faithful replication and transcription of DNA are essential for maintaining normal cellular function. These processes must occur with high accuracy, as minor errors can have significant downstream effects. Transcription requires opening the DNA double helix, exposing nucleobases to damage-inducing chemicals that can result in mutations. Therefore, most organisms possess a pathway dedicated to fixing DNA damage in transcribed regions: Transcription-Coupled Repair (TCR). Briefly, when the RNA polymerase is blocked by a bulky lesion, it can recruit DNA repair enzymes. This process can lead to a strand bias, where damage on the template strand of transcription is more efficiently repaired. Previous research has shown that such strand bias occurs in several human cancers. Here, I re-analyzed publicly available data from sequenced cancer cells to better characterize the source of transcription-associated strand bias in these cancers. Not all transcripts benefit from TCR because this process is polymerase-dependent. For example, tRNAs do not benefit from TCR because they are transcribed by RNA polymerase III. To quantify the impact of TCR, we investigated the mutation rate of tRNA genes and found that it is 10 times higher than that of protein-coding genes. Beyond tRNAs, another class of RNA molecules that might lack TCR is long non-coding RNAs (lncRNAs), although this is debated. I investigated the strand bias in mutational signatures for lncRNAs to test whether they benefit from TCR. This allows us to test if lncRNAs are transcribed by a polymerase with efficient TCR activity.

#016 - Dean, Ethan

Major: Sustainable Bioproducts - Bachelor of Science
Faculty Research Mentor: Mostafa Mohammadabadi, FWRC-Sustainable Bioproducts
Co-Author(s): Aadarsha Lamichhane, Arun Kuttoor Vasudevan, Mostafa Mohammadabadi
Funding: None | **Project Category:** Engineering

Fundamental Evaluation of Thermomechanical Densification of Wood
Wood has long served as a primary construction material in North America, and the forest products industry has continuously sought to enhance its performance and expand market opportunities through the development of engineered wood products. Mass timber products such as Cross-Laminated Timber (CLT) and Glue-laminated timber (glulam) have enabled the wood products industry to compete effectively with conventional materials such as steel and concrete in the construction of tall buildings and long-span bridges. Thermomechanical densification improves

the mechanical properties of solid lumber by softening the wood—typically through boiling—followed by compression in a hot press. Previous studies have demonstrated that CLT panels manufactured from densified wood exhibit significantly enhanced load-carrying capacity. Despite these promising results, a comprehensive understanding of the processing parameters governing densification efficiency and performance remains limited. This study systematically investigates the influence of key material and processing variables on the properties of densified wood. The effects of initial wood density, cutting pattern (flat-sawn and quarter-sawn), boiling time, pressing temperature, and moisture content were evaluated. Specimens produced under controlled conditions were subjected to bending, shear, hardness, water absorption, and thickness swelling tests to assess both mechanical performance and dimensional stability. The results provide fundamental insights into the interactions between wood characteristics and densification parameters, supporting the optimization of thermomechanical densification processes and enabling improved mechanical performance for advanced structural wood applications.

#215 - DeBona, Mike

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Gwendolyn Boyd-Shields, FWRC-Sustainable Bioproducts
Co-Author(s): Nauman Ahmed
Funding: College of Forest Resources, Forest and Wildlife Research Center | **Project Category:** Bio and Life Sciences

Enhancing Wood Durability: Assessing Bio-Based Preservatives for Resistance to Fungal Attacks
This study evaluated the antifungal efficacy of a bio-based preservative system against the brown-rot fungus *Gloeophyllum trabeum,* a standardized model organism for assessing wood durability. The preservative formulation consisted of *Cymbopogon schoenanthus* (lemongrass) essential oil (LGEO) and LGEO encapsulated within chitosan nanoparticles (CSNPs), designed to enhance stability and enable controlled release. Lemongrass essential oil contains bioactive monoterpenes, primarily citral (geranial and neral), which exert antifungal effects by disrupting membranes and interfering with fungal metabolic pathways. Chitosan, a cationic biopolymer derived from chitin, contributes intrinsic antimicrobial activity via electrostatic interactions with negatively charged fungal cell walls and membranes. Antifungal performance was assessed using the Food Poisoning Technique (agar dilution method). Four concentrations (1000, 750, 500 and 250 $\mu g \cdot mL^{-1}$) were incorporated into agar media, alongside an untreated control. Plates were inoculated with mycelial plugs of *G. trabeum*, and radial growth was measured at 3 plus 7 days post-inoculation. Percent inhibition was calculated relative to the control. Results demonstrated a concentration-dependent response. Free LGEO achieved 100% growth inhibition at 1000 and 750 $\mu g \cdot ml^{-1}$ after 7 days. In contrast, LGEO-loaded CSNPs exhibited 38% inhibition at 7 days, suggesting delayed or controlled release of active compounds from the nanoparticle matrix. While encapsulation reduced immediate antifungal potency, it may provide sustained delivery and reduced volatility. Future work should include release kinetics modeling, physiochemical nanoparticle characterization, standardized wood-block decay testing, and life-cycle assessment to evaluate environmental performance relative to conventional wood preservatives.

#216 - Diego, Natalia

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Shengfa Liao, Animal & Dairy Science
Co-Author(s): Jean Magloire Nguekam Feugang, Notsile Dlamini
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Using magnetic nanoparticles to purify boar semen can maintain sperm quality during prolonged storage
Prolonged storage of boar semen is essential for artificial insemination but is limited by a rapid decline in sperm quality, which compromises fertility and reduces semen shelf life. This deterioration is caused by damaged spermatozoa that generate oxidative stress and accelerate cellular aging. Targeted removal of defective sperm using nanotechnology has emerged as a potential strategy to improve semen quality during storage. Lectin-coated magnetic nanoparticles (LMNPs), which selectively bind to glycoconjugates exposed on compromised sperm membranes, may enable purification of semen samples by removing damaged cells. This study evaluated whether nanopurification with LMNP could enhance sperm quality during chilled storage. Extended semen doses (n = 5) from

Duroc boars were divided into four aliquots supplemented with 0 (Control), 5 (NP1), 7.5 (NP2), or 10 µg per 10^7 spermatozoa (NP3) and incubated at 37°C for 30 minutes. Following incubation and magnetic separation, samples were stored at 17°C for seven days. Sperm quality was evaluated on Days 0, 3, 5, and 7 using computer-assisted sperm analysis. Data were analyzed using linear mixed-effects models, with $P < 0.05$ considered significant. LMNP treatments did not improve sperm motility or morphology compared with the Control ($P > 0.05$). All groups showed a significant decline in sperm quality during storage, with total motility decreasing by ~30% from Day 0 to 7. Velocity parameters (VAP, VCL, and VSL) remained relatively stable over time and did not differ among treatments. Morphological abnormalities increased across storage days, particularly the prevalence of distal droplets. Overall, LMNP supplementation at the tested concentrations did not prevent the deterioration of sperm quality during prolonged storage. Future research should focus on optimizing nanoparticle composition, and dosage to improve removal of defective sperm. Understanding nanoparticle–sperm interactions at the molecular level will be essential for developing effective nanotechnology-based strategies.

#217 - Dillahunty, Maggie

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Leyla Rios de Alvarez, Animal & Dairy Science
Co-Author(s): Larry Leon Medina, Larry Leon, Cadence Jackson, Himani Joshi, Leyla Rios
Funding: None | **Project Category:** Biological and Life Sciences

Grazing performance, Microbiome, and Parasite Load of meat goats under Mississippi summer conditions. A comparison: Kiko vs. Spanish

Kiko and Spanish goats are important breeds for farmers because of their hardiness under challenging grazing conditions. A research was done at the H.H. Leveck Research Center of Mississippi State University, a group of 30 weaned bucks, 22 Kiko (K) from five states (OK, IN, WV, AL, MS) and 8 Spanish (S) from MS, similar in age 5-6 months, initial weight 26 ± 1.2 kg grazed warm-season forages in a rotational system, with 1% body weight supplementation with a commercial concentrate (16% CP). Measurements, included body weight for calculating average daily gain (ADG), body condition score (BCS), FAMACHA©, fecal egg count of nematodes (FEC; eggs per gram of feces, EPG), and coccidia (oocysts per gram, OPG), were taken biweekly a sub sample of 10 Kikos with the best performance were collected fecal swabs for microbiome analysis using 16S rRNA sequencing on days 0 and 85. Data was analyzed using SAS version 9.4 with a mixed model, and non-parametric variables with the Kruskal–Wallis test, microbial data was analyzed with MicrobiomeAnalyst. For ADG, there was no significant difference between breeds (K: 89.40 ± 1.5 g/day; S: 93.10 ± 2.4 g/day; P = 0.8955). Similarly, there was no significant difference in EPG (P = 0.6639; K: 822.91 ± 1075.98; S: 667.70 ± 868.38). However, there was a significant OPG x time (w) x breed (K and S) (P < 0.001), with K goats having higher OPG values (P = 0.0048). For BCS and FAMACHA©, there were no significant breed differences. Alpha diversity showed no differences (P = 0.42). Beta diversity also showed no group separation (P = 0.741). Dominant taxa in the fecal microbiome included Bacteroides, Papillibacter, Cubicacterium, Campylobacter, Veillonella, Aerococcus, Escherichia, and Dyosmobacter. Both breeds appear equally suitable for sustainable meat goat production in this area of the southeastern United States.

#017 - Dooley, Joseph

Major: Industrial Engineering - Bachelor of Science
Faculty Research Mentor: Jessica Gonzalez Vargas, Industrial and Systems Engineering
Co-Author(s): Amirtaha Taebi
Funding: None | **Project Category:** Engineering

Every Move Matters: Investigating How Procedural Skills Performance Influence Patient Outcomes in Endovascular Coiling Training

Cerebral aneurysms affect approximately 10–15 million individuals in the United States. Often asymptomatic until rupture, cerebral aneurysms are life-threatening, with nearly 50% of ruptures resulting in death. Survivors frequently experience permanent neurological deficits, long-term cognitive impairment, reduced quality of life, or severe complications such as stroke or coma. To treat unruptured cerebral aneurysms, endovascular coiling, a minimally

invasive treatment is preferred. Endovascular coiling involves inserting a microcatheter in the femoral artery and navigating it until reaching the brain aneurysm, where coils are then deployed to achieve occlusion. Due to the advanced technical skills required and the high patient risk involved, this research proposes the development of a Mixed Reality (MR) training system that will allow learners to practice endovascular coiling while understanding how their procedural performance can influence patient outcomes. However, before developing this MR training, it is essential to identify which procedural performance metrics and patient outcome metrics are currently assessed in clinical practice. Establishing this foundation will ensure that the MR system is grounded in clinically relevant indicators and can effectively bridge the gap between procedural skill acquisition and patient outcome impact. Thus, this study conducted a comprehensive literature review to identify key procedural and patient outcome measures associated with endovascular coiling. Preliminary findings highlight indicators such as packing density, microcatheter stability, coil deployment accuracy, and procedural time, all of which are associated with successful aneurysm treatment and reduced complication risk. The anticipated results will provide a structured framework that catalogs these metrics, summarizes how they are currently assessed in clinical practice, and proposes methods for integration into MR training. By linking simulation procedural skills performance to patient outcomes, this framework will guide the development of a MR training that will ensure novices perform procedures correctly and understand how their actions directly influence patient outcomes.

#134 - Doyle, Sophia Irene

Major: Agribusiness - Bachelor of Science
University: The Mississippi School for Mathematics and Science
Faculty Research Mentor: John Green, Southern Rural Development Center
Co-Author(s): Roseanne Scammahorn
Funding: None | **Project Category:** Social Sciences

The Extent to Which Financial Stress and Insecurity Influence Mental and Physical Health Across Incomes

Extant literature suggests that stress can cause several health issues such as cardiovascular complications, increased mortality rates, and mental health issues; financial instability and worry are some of the leading factors. This research project seeks to better understand the role that financial stress plays in overall health. Using layered crosstabulations, data from the national STAT Baseline Survey (Regional Rural Development Centers) was analyzed to identify the association between respondents' financial situation, financial stress, and health. Financial situation was assessed by questions related to income level, ability to pay expenses such as bills, and employment over the previous year. Financial stress was determined by respondents' perception and feelings towards their financial situation. Self-rated health was used to see if there were connections between the three categories. Those who had an annual income of $25,000 or less were 10% more likely to rank their health lower if they thought their income was going to decline in the coming year. This association between low self-rated health and an expected decline in income appeared at all income levels. However, there were much stronger associations between financial stress and health. Of those who made $25,000 or less and reported that they worried about their financial situation, only 19% rated their health as "very good" or "excellent." Meanwhile 49% described their health as "poor" or "fair." In this income group, low self-rated health was 30% more common among those who were under financial stress. People who made $100,000 plus and reported financial stress were 8% more likely to report poorer health. Although the pattern between financial stress and health was seen across income levels, it was notably stronger among those with lower incomes. These findings support the theory that financial stress significantly affects the health of individuals and impacts their overall wellbeing.

#218 - Duck, QuoJosalyn

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Federico Hoffmann, Biochemistry Nutrition Health Promo
Co-Author(s): Hunter Walt, Donald Yee
Funding: None | **Project Category:** Biological and Life Sciences

You Are What You Ate: Larval Diet Influences Gene Expression in Adult Mosquitoes
Larval nutrition can strongly influence the physiology and health of adult mosquitoes. Understanding how different nutrient sources affect gene expression provides insight into mosquito development and may reveal biological processes that could be targeted for vector control. This study examined how larval diet influences host gene expression over time by comparing mosquitoes reared on two nutrient sources: a carbohydrate-rich plant-based diet and a protein-rich animal-based diet. Adult mosquitoes were collected one day and five days after emergence to evaluate both immediate and longer-term transcriptional responses. RNA sequencing was used to assess genome-wide gene expression. Sequencing reads were trimmed using Trimmomatic and quality-checked with FastQC before transcript quantification with Kallisto. Differential gene expression analysis was performed using DESeq2 to identify genes whose expression varied due to diet, time, or their interaction. Principal component analysis revealed that larval diet caused a substantial difference in gene expression in newly emerged adults, but these differences became less pronounced over time. The first principal component separated samples primarily by collection day, indicating that time was the largest contributor to variation in gene expression. Gene clustering analysis identified multiple groups of genes with shared expression patterns, demonstrating diverse transcriptional responses to both diet type and age. Overall, larval diet strongly affects early adult gene expression, but these differences diminish by five days after emergence. These findings suggest that mosquitoes may adjust physiologically to their dietary conditions over time, reducing transcriptional differences between groups. Future work will focus on identifying the specific genes and regulatory pathways most responsive to dietary changes and determining how these shifts influence mosquito development and behavior.

#219 - Durfey, Quinn

Major: Horticulture - Bachelor of Science
Faculty Research Mentor: Tongyin Li, Plant and Soil Sciences
Co-Author(s): Abby Pennington, Jacob Arthur, Ali Alsughayyir
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Applications of biostimulants in the production of specialty sweet pepper cultivars
Sweet peppers are one of the most popular warm-season vegetables with distinct shapes, colors, flavors, as well as high nutrient density. Biostimulants are a newer category of agricultural products, made from microorganisms and natural compounds that are used to support plant growth in a more sustainable way. The objective of this research was to examine how different biostimulant applications impact plant growth, yield, and fruit quality of sweet pepper cultivars. Six sweet pepper cultivars were evaluated in this study, including Cornito Giallo, Escamillo, Green Machine, Carmen, SVPB8500, and Cornito Rosso. Three biostimulants were applied to each cultivar, including a seaweed extract (Kelpak Maxx, 1% solution), a plant growth-promoting rhizobacteria (Continuum V2, applied at 2 ml per gallon), and stabilized monosilicic acid (Dune, applied at 2 ml per gallon). Biostimulant treatments were applied every two weeks using manual fertigation, with each plant receiving 120 ml of solution. Control plants received the same amount of water without biostimulants. Results showed significant differences among pepper cultivars in terms of plant growth, yield, and fruit quality. Green Machine and SVPB8500 had the highest leaf SPAD values of 64.2 and 63.9, respectively, compared to other cultivars. Carmen, Cornito Giallo, Cornito Rosso, and Escamillo had similar plant heights ranging from 36.4 cm to 38.4 cm, which were greater than those of Green Machine or SVPB8500. Biostimulant treatments did not have a significant effect on leaf SPAD or plant heigh early in the 2025 growing season.

#018 - Edwards, Lauren

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Steve Elder, Ag & Bio Engineering
Co-Author(s): Alejandra Amaya, Mason Youngblood
Funding: NIH NIAMS | **Project Category:** Engineering

Refinement of In Situ Forming Implants and Microparticles for Sustained Delivery of Punicalagin
Osteoarthritis is a prevalent joint disease for which there are currently no disease modifying drugs. Punicalagin is a drug derived from pomegranates, and it is known for its antioxidant and anti-inflammatory properties. There is

evidence to suggest that punicalagin may be a disease modifying osteoarthritis drug and we are investigating in situ forming matrices (i.e. implants and microparticles) as a means of delivering this drug in a joint. This research focuses on methods for tuning the size of microparticles and drug release of these polymer-based matrices. Microparticles were created by emulsifying the formulations in oil. In order to tune the size of microparticles formed, the types of oil and emulsification methods were modified. Sesame oil has been used previously, and castor oil was investigated due to its higher viscosity, suggesting that larger microparticles could be expected. Methods for emulsification include homogenization, sonication, and syringe emulsification. These are preformed on identical formulation and oil combinations in order to compare their impacts. Duration, amplitude, and oil are modified to determine the tuneability of the system and identify the most feasible and effective method. A secondary objective was to determine the effect of different PLGA terminations on the drug release of implants, where termination refers to the chemical group at the end of each polymer chain. Punicalagin is more likely to form hydrogen bonds with acid-terminated PLGA, ester-terminated PLGA is more hydrophobic and degrades slower. For implant formation, formulations were prepared and pipetted into aqueous solution. This formed solid implants where the amount of drug released could be determined by spectrophotometry. Ongoing analysis is focused on refining and tuning emulsification methods to optimize the production of microparticles.

#019 - Eigbe, Eghonghon

Major: Civil Engineering - Bachelor of Science
Faculty Research Mentor: Jun Wang, Civil and Environmental Engineering
Co-Author(s): Sydney Howell
Funding: NIH OSHA | **Project Category:** Engineering

Cognitive Risks in Human-Robot Collaboration in Construction

Human-robot collaboration (HRC) involves robots working alongside humans in shared environments, combining human flexibility with robotic precision. Recent years have seen a significant rise in automation and robotics across multiple industries, including construction. A construction site is a highly dynamic and hazardous environment, so this presents unique challenges to workers' safety during human-robot interaction. Existing research on HRC in construction has primarily focused on physical hazards. On the other hand, cognitive risks affecting workers, such as mental workload, attention demands, and anxiety, have been underexplored. Cognitive risk is the risk of degradation, distortion, or manipulation of human or institutional cognition that results in defective judgment and decision-making. Understanding these cognitive risks is important, as they influence worker performance and overall safety in collaborative robotic environments. This project conducted a literature review to synthesize existing research on cognitive risks and their negative effects on workers caused by HRC in construction. A literature search was conducted using related keywords; peer-reviewed journals and articles relevant to the cognitive risks of HRC in construction were identified and studied. It was found that HRC offers great potential for making the workplace more efficient, but it still has some improvements that need to be made. Currently, the cognitive risks outweigh the potential benefits since there are not many ways to address these concerns. However, the potential benefits mean that this technology is definitely worth exploring and developing further.

#220 - Elmore, Reagan

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Galen Collins, Biochemistry Nutrition Health Promo
Funding: ORED Undergraduate Research Program | **Project Category:** Biological and Life Sciences

Does Activation of Proteasomes Restore Viability in Proteasome Mutations Associated with a Rare Neurodevelopmental Disorder?

The Ubiquitin Proteasome Pathway is a major cellular process responsible for the efficient degradation of most intracellular proteins. The pathway catalyzes the selective degradation of misfolded or mutant proteins using a large 2.5MDa multiprotein complex called the 26S proteasome. Several mutations within the ubiquitin-proteasome pathway are associated with neurodevelopmental disorders but are poorly studied. Recently, a recurrent missense mutation in the proteasomal ATPase PSMC5 (P320R) was identified in multiple unrelated children with developmental delays and

autistic spectrum behaviors. This dysfunction is likely due to reduced proteasome activity resulting from weakening the connection between the 19S regulatory particle and the 20S core particle. On the other hand, small-molecule activators of the proteasome are of interest in neurodegenerative research. In this study, we sought to test whether these proteasome-activating pathways, such as Protein Kinase A (PKA) and Protein Kinase G (PKG) signaling, can improve viability in neuroblastoma cells with the PSMC5 P320R mutation. The mutant cell lines were treated with different concentrations of rolipram (an inhibitor of PDE4, the cAMP phosphodiesterase, and thus an activator of PKA) and sildenafil (an inhibitor of PDE5, the cGMP phosphodiesterase, and thus a PKG activator). We then assessed viability by resazurin assays. Although sildenafil doesn't produce a detectable improvement in viability in mutant proteasome cells, rolipram does. This suggests that proteasome activation may be possible even in this mutation and may lead to therapeutic benefits that could also extend to other neurodevelopmental disorders.

#135 - Emanuel, Elizabeth

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Samuel Murphy, Psychology
Funding: ORED Undergraduate Research Program | **Project Category:** Social Sciences

Religiosity and depression; testing mental health stigma as a moderator.

Depression is common in the United States, yet many individuals do not seek psychological treatment, partly due to stigma surrounding mental health care. Some researchers have suggested that religiosity may influence attitudes toward mental health treatment, though the nature of this relationship remains unclear. The current study examined whether religiosity moderates the relationship between depressive symptoms and mental health stigma in an online survey of college students (N = 554) aged 18–46. Participants completed measures including the Revised Depression Questionnaire (RDQ), the Self-Devaluation and Stigma Scale (SDSS), and a single-item measure of religiosity. Religiosity was significantly positively correlated with shame (p = .04), self-blame (p = .01), and social inadequacy (p = .02), but was not significantly related to help-seeking stigma (p = .07). Moderation analyses indicated a trend-level interaction between depression severity and religiosity in predicting help-seeking stigma (p = .08), such that higher levels of depressive symptoms were associated with greater help-seeking stigma among participants who identified as religious. The observed pattern suggests that religiosity may play a role in shaping how depressive symptoms relate to attitudes toward treatment seeking, though this interaction did not reach statistical significance. These findings highlight the importance of addressing mental health stigma and improving the accessibility of mental health resources for students from diverse religious backgrounds.

#020 - Emmons, Zachary

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Shanti Bhushan, Mechanical Engineering
Co-Author(s): Josh Bowman, Shawn Aram
Funding: Naval Engineering Education Consortium | **Project Category:** Engineering

Predictions of ONRT Propeller-Hull Interaction using Open-Water Trained Machine-Learned Actuator Line Propeller Model

The propeller still bottlenecks high-fidelity CFD for ship maneuvering. Fully resolved blade simulations can reproduce the physics of hull-propeller-rudder interaction, but the meshing, time-step limits at high RPM, an the need to resolve tip-vortex roll-up make those calculations too expensive for design loops and parametric studies. Mid-fidelity body-force approaches reduce cost, but common actuator-disk implementations smear the swirl and miss key near-wake structures. Actuator line models (ALMs) recover much of that wake fidelity by distributing forces along rotating blade lines, yet standard ALMs depend on static lift and drag tables that do not respond correctly to unsteady loading or spatially varying inflow. This work extends an open-water trained machine learned actuator line model (ML-ALM) toward propeller-hull interaction for the Office of Naval Research Tumblehome (ONRT) configuration. The ML-ALM uses blade-resolved OpenFOAM data to train a neural network that directly predicts sectional blade forces from local flow features, replacing lookup-table polars within the ALM framework. Here, the training dataset is expanded to include a wide range of inflow pitch angles representative of off-axis inflow encountered in maneuvering and drift.

The model is first assessed in open-water conditions for both seen and unseen pitch angles to quantify generalization. It is then applied to a fully appended ONRT configuration to evaluate trends in propeller-hull interaction across multiple adrift angles and advance ratios. The goal is a propeller model that preserves thrust, torque, and near-wake swirl fidelity while allowing larger time steps and reduced meshing burden relative to blade resolved simulations, enabling practical CFD maneuvering workflows.

#021 - Ennin, Kofi

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Lalitha Dabbiru, CAVS Research
Co-Author(s): Daniel Carruth, Lalitha Dabbiru, Daniel Carruth, Chris Goodin
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Engineering

Off-Road End-to-End Autonomous Model (OREAM) for Unstructured Environments.
Autonomous driving in off-road unstructured environments is challenging, where not every single driving condition can be handled programmatically to achieve truly human-like driving. The standard, nonetheless, has always been to try to handle these endless conditions. Unlike on urban paved roads, off-road driving involves fewer traffic rules to follow. Instead, safe driving relies much more on human intuition. The primary objective is usually to avoid obstacles and reach the destination. Apart from fixed obstacles such as tree trunks, poles, and boulders, the navigator must perceive the surroundings and always choose the best path possible. A solid path is preferable to a muddy path when other options exist, just as a grassy path is preferable to shrubs. Traditional methods involved breaking down the process into perception, object detection, and path planning, each requiring extensive handling of edge cases. Even so, off-road driving is nowhere close to human driving. Human drivers, however, make these simple decisions easily. Considering this, we present OREAM: Off-Road End-to-End Autonomous Model. This model achieves autonomous driving solely by learning from human driving data. In other words, our model allows an autonomous vehicle to directly learn to drive in unstructured environments in a manner similar to human driver. Leveraging CAVS's off-road dataset, our model learns directly from raw sensor perception data and the corresponding navigation paths taken by human expert drivers to traverse the terrain. We adapt the model architecture based on Comma.ai's Supercombo path-planning model for our off-road level 2 (partial automation) autonomous driving. We present our model's path-planning capabilities with deployment on an MRZR vehicle to demonstrate its real-world capabilities.

#136 - Evans, Emily

Major: Human Development & Family Sci - Bachelor of Science
Faculty Research Mentor: Minel Guler, School of Human Sciences
Co-Author(s): JuYoung Lee, Magalie Martin, Allison Thigpen, Arabella Dowden, Maris James
Funding: None | **Project Category:** Social Sciences

How family socioeconomic status (SES) affects clothing access and self-esteem.
This study examines the relationship between socioeconomic status, clothing insecurity, and self-esteem. Socioeconomic status, determined by income, education, and occupation, influences access to adequate and affordable clothing. Limited access to appropriate clothing, defined as clothing insecurity, may negatively affect an individual's ability to express themselves and meet societal expectations. Because clothing plays a significant role in self-expression and social perception, restricted access may contribute to lower levels of self-esteem. This research explores how clothing insecurity impacts individuals' perceptions of self-worth. Specifically, the study investigates the relationship between SES and clothing access, the relationship between clothing access and self-esteem, whether clothing access mediates the relationship between SES and self-esteem, and differences in clothing access and self-esteem across SES groups. For our research, the target population will be undergraduate adolescents and young women between the ages of 18 and 22. The sample will be a range of females from different backgrounds to allow for comparison of SES. Our plan for the date collection will be from an anonymous survey distributed through different school platforms, social media, and student organizations. Participants will be volunteers and will complete

independently. The primary goal is to measure socioeconomic status, access to clothing, and self-esteem. Socioeconomic status will be measured using the Modified Kuppuswamy Scale, access to clothing will be scaled through the perceived Accessibility Scale, and self-esteem will be measured through the Rosenberg Self-Esteem Scale. All of these measurements are crucial in our findings to compare and identify differences in SES and their correlation to self-esteem and clothing access. The anticipated result is that lower SES status leads to less access to clothing, which leads to lower self-esteem.

#221 - Evans, Peyton

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Galen Collins, Biochemistry Nutrition Health Promo
Funding: ORED Undergraduate Research Program | **Project Category:** Biological and Life Sciences

Does *PSMC5* P320R Mutation Induce Inflammatory Gene Expression?

A rare neurodevelopmental disorder with autism-like behavior and learning delays is associated with a mutation of proline to arginine at the 320th amino acid of *PSMC5* gene, which is a mutation of the 19 regulatory particle of the proteasome. It is hypothesized that a lack of proteasome causes inflammation, more specifically neural inflammation, thereby causing neurodevelopmental disorders. The objective of this research is to determine if this mutation causes a cell autonomous interferon response. We are using neuronal-like cell line, BE(2)M17 with the P320R mutation genomically integrated by CRISPR-CAS9 engineering as either a single copy mutation (Heterozygous) or two copies of the mutation (Homozygous) in addition to the unedited control line (WT). These three lines were cultured for RNA extraction. This RNA was subsequently converted to cDNA for qPCR analysis of proteasome and interferon stimulated genes.

#022 - Fasola, Temitope

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Vivek Khare, Aerospace Engineering
Funding: BCoE Undergraduate Research Award | **Project Category:** Engineering

Design of Thermally Activated Foldable Bio-inspired Wing for Micro Air Vehicles

Micro Air Vehicles (MAVs) are critical for surveillance and search-and-rescue, yet traditional designs often struggle with weight penalties and mechanical complexity. Inspired by the segmented architecture in the Potter Wasp (Antodynerus punctatipennis), the actuation kinematics in this paper adopt the transverse Z-folding mechanism of Coleoptera (beetles) to maximize stowage efficiency. Utilizing composite segments connected by Veriflex shape memory polymer (SMP) hinges, the design aims to achieve a compact structure that maintains flight-ready rigidity. Unlike traditional mechanisms that rely on heavy servos, this design utilizes composite panels actuated by Veriflex Shape Memory Polymer (SMP) hinges to achieve a 56% reduction in planform area. Dynamic mechanical analysis (DMA) and isothermal tensile tests were performed for viscoelastic stress relaxation modeling using time-temperature superposition. Finite element analysis demonstrates a shape fixity of 96.9%, confirming the material's ability to lock the stowed configuration without auxiliary latches. Furthermore, the study establishes the kinematic framework for a distal-to-proximal Z-folding actuation strategy. By theoretically validating the inertial reduction associated with sequential folding, this research provides an efficient computational pathway for high-efficiency, solid-state foldable wings.

#137 - Felder, Regan

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Kevin J. Armstrong, Psychology
Funding: Presidential Scholar Funding through the Shackouls Honors College | **Project Category:** Social Sciences

Could a Workshop Increase Effective Cross-Referral Patterns Between Mental Health Professionals and Faith Leaders?

Mental health concerns are prevalent on college campuses across the United States, and in Mississippi, individuals often share these concerns with their faith leaders. However, faith leaders frequently lack formal mental health training, and mental health professionals often do not receive training in spirituality. Similarly, students often share mental health concerns that contain religious and spiritual content with mental health professionals. Through this project, an interactive local workshop assembling members from these two groups of professionals was held to help create connections with members of the other profession, increasing opportunities for effective cross-referrals. In this workshop, participants engaged in five rounds of rapid conferencing, where mental health vignettes were distributed for mixed-profession groups to discuss. Pre-workshop and post-workshop questionnaires were taken that assessed the likelihood of consultation and cross-referrals, whether likelihoods differed based on the mental health situation, and how the workshop may have changed overall views of working with the other profession for consultations and referrals. Findings concerning overall impact indicated that 89.3% of participants believed that the workshop increased their openness to engage in cross- referral behavior with members of the other profession. Mean confidence that members of the other profession could provide an effective consultation rose from 6.9 to 8.6/10 for faith leaders and from 7.1 to 8.1/10 for mental health professionals. These results indicate that a localized workshop increased openness to cross-referrals in both professional groups. Thus, this study provides a framework for similar local workshops to be conducted in other communities to foster pathways for cross-referrals between these professional groups. One limitation of this workshop format is that there are no outcome data concerning whether clinical outcomes of clients/students are improved when cross-referrals are made. Future research will be needed to assess the impact of cross-referrals on case outcomes.

#222 - Ferrell, Haley

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Trent Smith, Animal & Dairy Science
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evaluation of the relationship between hair coat shedding ability and birth and weaning weights in Angus cattle

The objective of this study was to evaluate the association of winter hair coat shedding ability and birth and weaning weights in Angus cattle. Data were collected on calves of fall and spring calving purebred Angus females between the years 2019-2025, resulting in 189 birth weight and 126 weaning weight records. Dams were observed once monthly by two trained technicians beginning the third week of March at 30d increments until July. Hair shedding was evaluated with a visual score ranging from 1 to 5, with 5 indicating no shedding and 1 indicating completely shed. The month of first shed (MFS) was determined when the average hair shedding score was ≤ 3.5. Shedding data were analyzed using the MIXED procedure of SAS with BW (birth weight) and WW (weaning weight) as response variables with fixed effects of MFS, sex, age of dam and sire of the calf as random. Age of calf was included in the model for WW as a covariate. Birth weight and WW were considered traits of the dam. Significance was declared at $P \leq 0.05$. Month first shedding was not significant for birth weight. In contrast, MFS was significant for weaning weight. Dams that reached an average shedding score of ≤ 3.5 by May weaned a lighter calf compared to those females that reached the same score in March, June, and July. Calf WW was similar for those dams that shed in March, June, and July. These results show an association between the dam's hair shedding ability and the WW of the calves that they produce. Selection of hair shedding ability in the future could benefit beef producers by improving weaning weights.

#098 - Feyerherm, Ava

Major: Business Administration - Bachelor of Business Adm
Faculty Research Mentor: Kuan-Ming Huang, Agricultural Economics
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Business and Economics

Consumer Perceptions and Willingness to Pay for Food Safety and Origin of Blueberries: Strategic Marketing Implications for Mississippi Growers

Growing consumer concern regarding food safety, transparency, and product origin has increasingly influenced

purchasing decisions in fresh produce markets. Over the past two decades, U.S. per capita blueberry consumption has risen from 0.26 pounds in 2000 to 2.54 pounds in 2021, driven by demand for healthy, antioxidant-rich foods. Mississippi contributes to this expanding market with nearly 500 farms producing 2 to 3 million pounds annually and generating approximately $13 million in sales. Despite the crop's economic and cultural importance, including its designation as the official state fruit in 2023, limited research has examined how consumers value specific food safety technologies and origin claims in blueberry markets. This study examines consumer willingness to pay (WTP) for food safety and origin attributes in fresh blueberries using a discrete choice experiment embedded within an online consumer survey. The experiment evaluates four attributes: USDA Organic certification, Mississippi-grown labeling, and the presence of a chitosan coating—a natural, biodegradable film applied to inhibit microbial growth and extend shelf life, and price per 16-ounce container. Consumers' attribute-level WTPs are estimated using a mixed logit model in WTP space, enabling direct interpretation of monetary premiums associated with each characteristic. Our preliminary results show positive WTP for organic certification and chitosan coating. The findings will provide insight into whether consumers place measurable value on organic certification, Mississippi-grown, and innovative post-harvest safety technologies. Results offer strategic implications for Mississippi blueberry growers considering certification programs or investments in food safety enhancements and contribute to a broader understanding of how safety and origin attributes shape decision-making in fresh produce markets.

#223 - Fikes, Kinsey

Major: Environmental Econ & Sustain - Bachelor of Science
Faculty Research Mentor: Brenna Jungers, Agricultural Economics
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

A Cost-Effectiveness Analysis of Different Invasive Carp Management Incentives

Invasive carp have been an issue of increasing importance across the Mississippi River Basin for decades for several reasons, including threats to native and sport fish food chains, threats to native plant species, and impacts on recreational fishing and boating. However, research surrounding management strategies for these species is limited, especially in the context of the Mississippi River. Through an interview with the Mississippi Department of Wildlife, Fisheries, and Parks, we discovered that there have been unsuccessful attempts to fund the creation of commercial markets for invasive carp. In this study, we aim to add to the literature on aquatic invasive species control in the region by creating a Gordon-Schaefer bioeconomic model of carp populations in the lower Mississippi River and pairing these results with a potential profit function, which is based on U.S. export prices for carp, as well as variable costs that fishermen face. This combination allows us to test what level of subsidy would be necessary to incentivize commercial fishermen to enter the market for invasive carp, which are traditionally not a high-value fish. We can then compare these costs to the state with potential costs to sponsor a bow fishing tournament, which is another common way to catch invasive carp. These results will allow us to determine which management strategy would be optimal for a state subsidy program, while adding to the limited literature about effective aquatic invasive species management in the lower Mississippi River.

#023 - Fox, Peyton

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: David Van Den Heever, Ag & Bio Engineering
Co-Author(s): Zack Murphy, Emme Levy
Funding: None | **Project Category:** Engineering

Using FPVS and EEG to Identify Neural Differences in Dyslexia

Dyslexia is a learning disorder that primarily affects reading, spelling, and phonological processing. This study examines how individuals process different types of symbol-based and phonological stimuli using Fast Paced Visual Stimulation (FPVS) in an oddball paradigm. Participants are shown rapid sequences of letters, numbers, words, rhyming patterns, and math equations, with occasional oddball stimuli embedded within the sequences. This method allows researchers to measure automatic neural responses related to visual, phonological, and semantic processing. So far, approximately twelve undergraduate participants without dyslexia have been tested to establish baseline

neural response patterns. Data collection and analysis are still ongoing. The goal of this research is to determine whether different categories of stimuli produce distinct neural responses and to better understand processing differences that may be associated with dyslexia. Findings from this work may help improve future screening methods and educational support strategies.

#224 - Frye, Chase

Major: Agricultural Science - Bachelor of Science
Faculty Research Mentor: JoVonn Hill, Agricultural Science & Plant Protec
Co-Author(s): Pat Wooden, Pat Wooden
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Mapping the water striders (Hemiptera, Gerridae) of Mississippi

Water striders (Hemiptera: Gerridae) are skating aquatic insects with piercing-sucking mouthparts that opportunistically feed on prey trapped by surface tension. Because many striders have wings and can leave inhospitable environments, their absence is an early indicator that a water system is polluted, especially by contaminants such as oil or soap. These polymorphisms also provide information on population stability and water seasonality beyond simple presence and absence. Mississippi has a variety of natural and manmade aquatic habitats suited for water striders and a heavy reliance on the endemic water systems for agricultural irrigation and urban infrastructure. Monitoring the biodiversity of aquatic insects can provide key insights as environments change seasonally and over the long term. Despite their importance, the last aquatic Hemiptera checklist for the state was published in 1988. Since this publication, humans have altered waterways to meet their needs, and taxonomy has continued to evolve. This study aims to create a current checklist of Gerridae, providing a more comprehensive understanding of what can be found in Mississippi before it is lost, and to digitize this material for ease of scientific access. Much of the material from previous work has been deposited into the Mississippi Entomological Museum, which formed the core of this work, supplemented by database and fresh collections. Through these efforts, 1,661 historical specimens were digitized, and 89 fresh specimens were caught and digitized, creating a comprehensive list of what is currently known for the state of Mississippi, including one new state record and 124 new county records.

#024 - Fulford, Charles

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Lauren Priddy, Ag & Bio Engineering
Co-Author(s): Santanu Kundu, Blake Bell, Honor Elchos, Mathew Priddy
Funding: None | **Project Category:** Engineering

Characterizing Polymer Ceramic Composite Materials for 3D Printing

In tissue engineering, biodegradable scaffolds have the potential to be 3D printed and integrated into native bone tissue to promote regeneration of healthy tissue in a region with significant damage. This would serve as an alternative to autografting, which increases risk of infection in the defect. The materials that were examined include composites of 50:50 poly(lactic-co-glycolic acid) (PLGA), which is a biocompatible polymer, and nano-hydroxyapatite (nHA), a compound that is the mineral component of bone. The objective of this study is to characterize the material properties of three composites of PLGA and nHA, to develop a set of parameters for 3D printing them. Three sample types-0, 10, and 20 wt% nHA-were prepared by dissolving in acetone and stirring for 26 hours. Then, the material was dried at 60°C and 20 inHg for 24 hours. To break apart the materials into pieces suitable for printing, a material press was set to 70°C, and 1 ksi was applied with a waffle-shaped mold placed on the press. To determine the printing parameters such as temperature and pressure of these different composite formulations, differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), and rheology were performed. DSC provides a temperature range at which the material properties are changing. Past this temperature range, the material enters a flowable state

where it is suitable for printing. TGA shows the temperature at which the sample begins to degrade, providing further understanding of thermal limits and verifying the absence of acetone in the samples. Rheological investigation provides information regarding viscosity as a function of shear rate. This information is critical when evaluating how well a material may flow during extrusion and maintain its shape after printing. These material characterizations enable the subsequent goals of this project by informing the parameters for successful 3D printing of these composite materials.

#225 - Galvan Galvan, Marcos

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Jessica Halfen, Animal & Dairy Science
Co-Author(s): Allison Goodson, Mackenzie Reese, Francieli Dell'Osbel, Kandy Tilley
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Effects of blackberry and muscadine grape pomace-derived phenolic compounds on murine RAW 264.7 macrophages proliferation rate.

Blackberry (BBP) and muscadine grape (MGP) pomace phenolic compounds (PC) were evaluated as antioxidants in LPS-challenged RAW 264.7 macrophages. PC were extracted from dried pomace using ethanol and water as solvents. Cells were cultured to 85% confluency in 75 cm^2 flasks, plated at 50,000 cells/well in 96-well plates, and incubated at 37 °C with 5% CO_2. Cells were preincubated with or without PC for 6h and then treated with or without LPS (100 ng/mL) for 12h. Treatments included control (media only), ethanol (media+ethanol; 1:10 dilution, v/v), LPS (media+LPS), MGP (200 µg/mL+LPS), BBP (200 µg/mL+LPS), or cyanidin-3-glucoside (CYD; 10 µg/mL+LPS), and were tested in two exposure strategies: prevention and prevention+treatment. In prevention, LPS challenge was performed after removing PC from cells, while for prevention+treatment, the LPS challenge was performed with PC inclusion. Cell proliferation was quantified using the MTT assay (Roche), and data were analyzed using the MIXED procedure of SAS with 4 replicates. A treatment effect was observed ($P < 0.01$), with greatest proliferation in MGP (117.3 ± 2.0%) and CYD (110.1 ± 2.0%), whereas LPS (104.5 ± 2.0%), BBP (100.8 ± 2.0%), and control (100.0 ± 2.0%) didn't differ, and ethanol reduced proliferation (65.5 ± 2.4%). A main effect of exposure strategy was observed ($P < 0.01$), with greater proliferation in prevention+treatment compared with prevention only (104.5 ± 1.2 vs. 94.9 ± 1.2%). There was a trt × exposure interaction ($P < 0.01$), with greatest proliferation in MGP and CYD under prevention + treatment conditions (123.5 ± 2.9% and 118.2 ± 2.9%, respectively; $P < 0.05$). These findings suggest muscadine grape pomace phenolic compounds support macrophage proliferation during inflammatory challenge.

#138 - Garcia, Katie

Major: Fashion Design & Merchandising - Bachelor of Science
Faculty Research Mentor: JuYoung Lee, School of Human Sciences
Funding: ORED Undergraduate Research Program | **Project Category:** Social Sciences

Strengthening U.S. Cotton Supply Chain Resilience: A Study of Robustness, Agility, and Integrity in the North American Cotton Industry Supply Chains

As one of the leading cotton exporters, the United States cotton industry is essential to global fiber and textile production. However, recent global and environmental challenges have revealed vulnerabilities and instability within the cotton supply chain. For the cotton supply chains to become more efficient and profitable, they must improve their organizational resilience. A company's organizational resilience has been linked with factors such as robustness, agility, and integrity. Robustness measures an organization's ability to overcome unfavorable market conditions, agility measures an organization's reaction time to these unfavorable conditions, and integrity measures the cohesion of employees within an organization during an unfavorable time. Prior research has shown that the competitive strategies of cost leadership, differentiation, and focus contribute to organizational resilience, so it is necessary to figure out the extent to which these three generic resilience strategies may impact the North American cotton industry supply chains' resilience. The study will use Qualtrics to survey participants across the U.S. cotton supply chain and will collect data based on the organizational resilience scale by Kantur and Iseri-Say and the competitive strategy scale by Porter. The reliability testing and hypothesis testing will be conducted using SPSS. Although research

concerning the North American cotton industry supply chains and research concerning organizational resilience already exist, there has not been research that bridges the gap between these two topics. Since cotton is one of the highest-grossing revenue sources for the North American economy and that of the United States specifically, it would prove advantageous to examine the industry in terms of resilience measures, such as robustness, agility, and integrity, to decide the best way to move forward within the industry despite recent unfavorable conditions. Therefore, the purpose of this study is to investigate the relationship between the competitive strategy and organizational resilience in cotton supply chains.

#139 - Garrard, Isabella

Major: Data Science - Bachelor of Science
Faculty Research Mentor: Jonathan Barlow, Data Science
Co-Author(s): Laura Zseleczky
Funding: None | **Project Category:** Social Sciences

Growing the School: Building a Data-Driven Social Media Analytics Dashboard

This project involves the development of a customized social media analytics dashboard for a university affiliated research center seeking to expand its reach among younger audiences, particularly students and individuals unfamiliar with its work. The primary objective is to design a centralized tool that tracks performance metrics aligned with the organization's communication goals and audience growth priorities. Rather than conducting a formal research study, this project focuses on identifying and organizing the most relevant metrics to support strategic decision making. An initial review of commonly used social media indicators, including reach, impressions, engagement rate, follower growth, click through rate, and audience demographics, was conducted to determine which measures provide meaningful insight beyond surface level performance. These metrics were then evaluated in consultation with the center's communications lead to ensure alignment with organizational priorities such as increasing student awareness, improving content effectiveness, and strengthening overall digital presence.
The dashboard is designed to consolidate data across platforms and present it in a clear and actionable format. Although development is ongoing, it is expected that the dashboard will reveal demographic differences across platforms and highlight variations in engagement across content types such as graphics, informational posts, and short form video. These insights will enable the organization to adjust its content strategy based on measurable performance trends. Overall, this project aims to provide a structured and sustainable framework for monitoring social media performance. By aligning analytics with defined outreach goals, the dashboard will support more intentional communication strategies and more effective engagement with target audiences.

#025 - Garrison, William

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Christopher Hudson, Computer Science and Engineering
Co-Author(s): Daniel Carruth, Jordon Jasper, Timothy Sellers
Funding: CAVS Research | **Project Category:** Engineering

Modernizing Autonomous Vehicle Sensing with a ROS1-ROS2 Bridge for High Resolution LiDAR

Upgrading sensors on autonomous vehicles (AVs) can significantly improve environmental awareness and thus improve vehicle decision making, but modern sensors do not always integrate cleanly with existing autonomy software. At Mississippi State University's Center for Advanced Vehiclular Systems (CAVS) this project upgraded the Polaris MRZR autonomous vehicle from a 64-beam Ouster LiDAR to a 128-beam Ouster LiDAR to provide higher density point cloud data. A key integration requirement was compatibility between the MRAK ROS1 vehicle control unit and a ROS2 exclusive LiDAR sensor. To bridge this communication gap a bidirectional ROS1-ROS2 bridge was integrated. This bridge can relay critical topics across ROS versions. This enables ROS1 nodes to subscribe to ROS2 point cloud data while also supporting access to ROS1 outputs from ROS2 for validation, and future integration. As a result, 128-beam LiDAR data is now successfully received within the ROS1 vehicle stack through the bridge, enabling immediate use of higher density sensor data. This bridging pipeline provides a reusable mechanism for integrating ROS2 sensors into ROS1 vehicle stacks and vice versa without full system migration. Future work will focus on MRZR field validation and performance evaluation of the downstream effects of the higher-resolution LiDAR data.

#140 - Gault, Nina

Major: Communication - Bachelor of Arts
Faculty Research Mentor: Zahed Arman, Communication
Co-Author(s): Teandra Richardson, Katherine Murphy
Funding: None | **Project Category:** Social Sciences

Tampax Chemical Crisis: Impact on Consumers' Trust and Attitudes

In recent years, the trend of menstrual health awareness has grown, and consumers have begun demanding greater transparency about products they use in and on their bodies. One of the most significant controversies involves Tampax and concerns about potentially harmful chemicals in tampons. Groups raised questions about ingredients and certain trace chemicals, as well as their long-term health implications. For Tampax, a brand built on trust and intimate use of products, a crisis like this poses a serious reputational threat. Our research examines this "chemical crisis" with Tampax products to better understand its origins, stakeholder reactions, and broader implications from brand credibility to consumer confidence and communication within the feminine hygiene world. This study measured consumer trust, impact, and buying behaviors before and after the Tampax crisis. For this study we utilized Qualtrics to collect over 100 responses from college-aged females who attend Mississippi State University. Through survey analysis with SPSS, we measured consumer trust, impact, and buying behaviors. Through Pearson correlation analysis, we determined that as awareness of the crisis increased, negative consumer sentiment also increased. Negative media reports are related to negative sentiment towards the brand, as evidenced with the survey. Through the paired t-tests, we determined that learning about potential chemicals in Tampax products significantly reduced respondents' trust in the brand. Awareness of the chemical reports also negatively influenced respondents' perceptions of product safety. These findings support the study's hypothesis that the chemical controversy could reduce consumer trust and influence purchasing behavior. For Tampax, this highlights the importance of proactive crisis communication strategies that address safety concerns and provide transparent information about product ingredients and testing procedures.

#226 - Gean, Bailee

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Andy Kouba, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Carrie Vance, Samantha Shablin, Samuel Mathes, Austin Simpson, Samantha Thoman
Funding: Mississippi Agricultural and Forestry Experiment Station | **Project Category:** Biological and Life Sciences

Comparison of dermal cortisol sampling methods during natural and stimulated cycles in *Cryptobranchus alleganiensis*

The eastern hellbender (Cryptobranchus alleganiensis) is an aquatic, giant salamander endemic to the eastern United States. The species is rapidly declining across its range due to habitat loss and degraded water quality, adding additional recruitment pressures to already small populations. Steroid hormones such as cortisol regulate an animal's response to change and provide insights into how individuals cope with environmental stress, However, traditional hormone collection methods like blood sampling present significant challenges as extended handling and venipuncture can raise cortisol levels. Alternatively, noninvasive dermal hormone sampling minimizes handling time and enables rapid sample acquisition. To validate this method and determine whether dermal cortisol levels accurately reflect changes in physiology, we used manual restraint to mimic a natural stress response (N = 4) and an adrenocorticotropic hormone (ACTH) challenge to induce a stimulated hormone response (N = 14). Dermal swabs were collected on the dorsal, ventral, and chin area of each animal before each respective challenge. Dermal swabs were collected 15, 30, 45, 60, 90, and 120 minutes after handling during the manual restraint challenge and 1, 2, 4, 6, 8, 12, 24, 48, and 72 hours after handling during the stimulated hormone challenge. Cortisol concentrations were measured using a cortisol enzyme immunoassay. We found that cortisol concentrations measured from swabs taken on the dorsal and ventral sides did not significantly differ from each other ($p > 0.05$), though were significantly higher than those collected on the chin area ($p < 0.0001$). Additionally, cortisol levels from the manual restraint challenge were highest at 45 minutes post-restraint ($p = 0.005$) and highest at 8 hours post-ACTH administration ($p = 0.088$). By understanding glucocorticoid levels through natural and artificial stimulation, we aimed to improve our

understanding of hellbender physiology and contribute additional support to noninvasive hormone sampling methods in short-term and long-term monitoring.

#026 - Gillespie, Jordan

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Vivek Khare, Aerospace Engineering
Funding: None | **Project Category:** Engineering

Thermoplastic Composite Electronic Housing Systems for Satellite Space Applications: Experimental & Simulation Overview

This research investigates thermoplastic-based satellite electronic housing systems that protect mission electronics, reduce mass, and support practical manufacturing and end-of-life options. Five candidate polymers were reviewed and narrowed to PEEK, PEI, and LM-PAEK based on their balance of space-relevant manufacturing, mechanical capability, and recyclability potential. The housing concept is assessed against key service demands that drive spacecraft packaging design, with an emphasis on thermal radiation and heat-flux exposure, as well as the structural loading limits that govern stiffness, deformation control, and long-term durability. The outcome is a structured comparison of high-performance thermoplastic and reinforced variants for electronic housings that connects material selection directly to thermal and mechanical requirements and defines clear performance criteria for satellite service.

#027 - Gillum, Jillian

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Christopher Hudson, Computer Science and Engineering
Co-Author(s): Callie Simon
Funding: None | **Project Category:** Engineering

Posture Classification of Dairy Cattle in Freestall Environments Using YOLOv11

Monitoring cattle posture is an important component of early health assessment in dairy production systems, as changes in lying and standing behavior can indicate emerging conditions such as mastitis, lameness, and metabolic disorders. While computer vision approaches have shown promise for livestock monitoring, consistent posture detection in commercial freestall environments remains challenging due to occlusions, variable lighting, and cluttered backgrounds. This project evaluates the performance of a YOLOv11 object detection model trained on a hand-labeled dataset to classify dairy cattle posture as standing or lying. A dataset of freestall images was manually annotated with bounding boxes and posture labels. The annotated images were divided into training and validation subsets, and a YOLOv11 model was trained to detect cattle and assign posture categories. Model performance was assessed using standard object detection metrics, including precision, recall, and mean average precision (mAP), to quantify detection accuracy under realistic freestall conditions. This work serves as a foundational component of a broader multimodal behavior-monitoring system under development for precision dairy management. By establishing a validated approach for posture classification using hand-labeled freestall imagery, this project provides the baseline detection capability required for integrating additional behavioral, environmental, and physiological data streams. Future work will focus on integrating this posture-classification module with additional computer vision and sensor-based components to support richer multimodal analysis of cattle behavior, health indicators, and activity patterns within precision dairy systems.

#028 - Giri, Niranjan

Major: Computer Engineering - Bachelor of Science
Faculty Research Mentor: Nayeon Lee, CAVS Research
Co-Author(s): Sungkwang Mun, Saugat Karki, Liu Qing, Xie Justin
Funding: BRIDGES | **Project Category:** Engineering

Impact-Induced Sound Analysis for Material Property Classification via Machine Learning
This research aims to develop a material classification system to distinguish between metallic and non-metallic materials using acoustic and visual features. This motivation sterns from the recycling industry which heavily rely on manual inspection, and that becomes time-consuming and limited in scalability. To address this, data collection was conducted through controlled impact testing, where material samples were dropped from a fixed height onto a rigid surface three times to ensure repeatability. The height was then reduced by half, and the procedure was repeated to capture variations in impact energy and acoustic response. The acoustic signals are examined with regard to material properties such as density and elastic modulus, given that the natural frequency of a structure is governed by its stiffness and mass. The system is implemented using Python and PyTorch for neural network training, with signal processing performed via libraries such as NumPy and SciPy. The fundamental frequency and spectral characteristics of impact-induced sounds are analyzed using advanced signal processing methods to facilitate material classification. Time-domain and frequency-domain features are extracted from recorded acoustic signals and used to characterize the dynamic response of different materials. This approach has the potential to enhance efficiency and reduce human error in industrial sorting applications.

#227 - Goetsch, Kyra

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Hossam Abdelhamed, Department of Comparative Biological Science
Co-Author(s): Munshi Mustafiz Riman, Amos Olowookere
Funding: NIH | **Project Category:** Biological and Life Sciences

Contribution of Central Carbon Metabolism Enzymes to Oxidative Stress Resistance and Fitness in *Listeria monocytogenes*
Listeria monocytogenes is a facultative intracellular foodborne pathogen that must withstand oxidative stress and efficiently utilize host-derived carbon sources to survive, replicate, and persist during host-relevant stress conditions. Its adaptation to reactive oxygen species generated by host immune cells, together with strong metabolic flexibility, is therefore essential for pathogenic success. Central metabolic enzymes are increasingly recognized as key contributors to both oxidative stress resistance and bacterial fitness. In this study, we investigate the role of several metabolic enzymes by deleting their encoding genes in the serotype 4b strain *L. monocytogenes* F2365. Specifically, we generated in-frame deletions of *pgi, chp, deoB, fbp, rpe3,* and *rpiB1*, which encode glucose-6-phosphatase isomerase, 6-phosphogluconolactonase, phosphopentomutase, isomerase B, respectively, all implicated in oxidative stress responses and glucose/carbon metabolism. Targeted gene knockouts were constructed using plasmid-mediated homologous recombination via allelic exchange. Upstream and downstream flanking regions of each gene were amplified by overlap extension PCR with gene-specific primers, cloned into the pHoss1 suicide vector and introduced into calcium chloride-competent *Escherichia coli* for plasmid propagation. Purified constructs were then electroplated into sucrose-treated competent *L. monocytogenes* F2365, and double-crossover recombinants were selected. Successful gene deletions were confirmed by colony PCR and Sanger sequencing. Phenotypic characterization of the Δ*pgi*, Δ*chp*, Δ*deoB,* Δ*fbp,* Δ*rpe3*, and Δ*rpiB1* mutants revealed delay growth than the wild-type strain in the presence of hydrogen peroxide, indicating reduced metabolic efficiency and impaired oxidative stress tolerance. These findings highlight the critical contribution of central carbon metabolism enzymes to *L. monocytogenes* survival under oxidative stress and provide and genetic platform for dissecting the metabolic-virulence interface.

#228 - Gomez, Blanca

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Caleb Lemley, Animal & Dairy Science
Co-Author(s): Kasey Elder, Kasey Elder, Katherine Kennedy, Marcus McGee
Funding: None | **Project Category:** Biological and Life Sciences

Influence of Maternal Melatonin Supplementation in Late Gestation on Behavioral Reactivity of Angus Calves at Weaning

Melatonin regulates circadian rhythms and modulates stress physiology through endocrine pathways such as the hypothalamic–pituitary–adrenal (HPA) axis. Maternal supplementation during late gestation has been shown to influence fetal neurodevelopmental signaling, but postnatal behavioral outcomes remain unexplored. Weaning is a major stressor for beef calves and can reveal differences in temperament. Our study aimed to assess the effects of third-trimester melatonin supplementation on behavioral responses of Angus beef calves during and after weaning. Angus cows (n = 24) in late gestation were randomly assigned to control (CON) or melatonin (MEL) groups. Melatonin was dissolved in ethanol and applied to supplemental feed at 200 µg/kg body weight; CON cows received equivalent vehicle control. Treatments began at approximately day 209 of gestation and continued for 54 days. Calves were weaned at approximately 180 days of age. Exit velocity (EV), chute score (CS), exit score (ES), pen score (PS), and temperament score (TS) were collected on day 0 (weaning) and days 5, 10, and 15 post-weaning. Behaviors were analyzed using PROC GENMOD or PROC GLIMMIX with fixed effects of treatment (TRT), time, and TRT × time. No differences were detected for PS ($P > 0.09$) or ES ($P \geq 0.20$). CS differed by treatment ($P = 0.03$), with calves born to CON dams having an 81% probability of CS = 1 (docile), whereas calves born to MEL dams showed greater variability (63% CS = 1, 21% CS = 2, 15% CS = 3). TS showed no TRT × time effect; however, a TRT × sex effect was observed. Heifers from MEL dams differed from heifers from CON dams (56% vs 15% TS = 3; 43% vs 79% TS = 2; 1% vs 11% TS = 1, respectively). Late-gestational melatonin supplementation increased post-weaning behavioral reactivity, suggesting altered stress-response programming requiring further research.

#141 - Gonzalez, Fatima

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Brittany Lancaster, Psychology
Co-Author(s): Emmory Bridges
Funding: None | **Project Category:** Social Sciences

Parent communication and student achievement: Insights from the Add Health study

Social relationships influence student development and achievement (Chen et al., 2023), with strong parent-child relationships linked to higher academic success (Hernández-Padilla et al., 2023). This study explores whether perceived communication between youth and their parents is associated with academic achievement in four subjects: English, math, history/social studies, and science, using data from the National Longitudinal Study of Adolescent to Adult Health. It was hypothesized that students reporting higher parental communication satisfaction would have higher composite scores or grades across the four subjects than those with lower satisfaction. Participants included 6,259 adolescents in Grades 7-12, ages 12-18 (51.5% girls, 48.5% boys; 66.8% White, 24.8% Black, 3.8% Native American, 3.6% Asian/Pacific Islander, 6.7% other). Participants independently reported their communication satisfaction with both their mothers and fathers via a 5-point Likert scale ranging from 1 (*Strongly agree*) to 5 (*Strongly disagree*). Grades were also self-reported where 1 indicated an A, 2 a B, 3 a C, and 4 a D or lower. Findings indicated that satisfaction with mother communication predicted higher grades in core subjects, $F(1, 6257) = 90.05$, $p < .001$, $R^2 = .014$, and satisfaction with father communication also predicted higher grades, $F(1, 6257) = 155.50$, $p < .001$, $R^2 = .024$. Greater satisfaction with both mother and father communication was associated with higher grades, mothers: $b = 0.07$, $SE = 0.01$, $t(6257) = 9.49$, $p < .001$; fathers: $b = 0.06$, $SE = 0.005$, $t(6257) = 12.47$, $p < .001$. This highlights the role of parent-child communication in academic achievement, suggesting that further exploration of adolescents' relationships with their parents may reveal ways to improve academic performance. Future studies should include more diverse populations across age, cultural, and socioeconomic contexts.

#229 - Grantham, Madeline

Major: Forestry - Bachelor of Science
Faculty Research Mentor: Ashley Schulz, FWRC - Forestry
Co-Author(s): Kristy McAndrew
Funding: Undergraduate Research Scholars Program | **Project Category:** Biological and Life Sciences

Hidden Biodiversity: Arthropod Responses to Forest Heterogeneity
Arthropods serve crucial roles in forested ecosystems including pollination, nutrient cycling, sustenance for wildlife, and natural disturbance. How arthropod biodiversity may respond to variation in forest structure is an essential aspect of forest management that is often overlooked. This project aims to determine the presence or absence of a relationship between increasing forest stand heterogeneity and arthropod species richness and diversity. We established three plots in each of our six forested sites (two pine stands, two hardwood stands, and two mixed wood stands) located in the John W. Starr Memorial Forest and Noxubee National Wildlife Refuge. Within each plot, arthropods are being sampled biweekly for a year, from October 2025 to 2026, using pitfall traps, funnel traps, and flight-intercept traps. Plots will not be inventoried until Summer 2026 to calculate plant biodiversity metrics for each forest stand, but preliminary results from the arthropod collections will be discussed. Through the collection of arthropods in both monoculture and mixed species stands, we can identify dominant arthropod orders and families and quantify diversity indices in study plots. We hypothesize that heterogeneous stands contain greater arthropod diversity because of the increased diversity of plants hosts compared to the monoculture stands. Further, this study is novel as it documents arthropod activity and biodiversity during the growing season, but also through the late fall, winter, and early spring, seasons that most arthropod biodiversity studies do not consider. We aim to shed light on understudied arthropod guilds that are essential to forest health and function and inform management practices that promote biological diversity within forest ecosystems through the results from this study.

#116 - Green, Madelynn

Major: Anthropology - Bachelor of Arts
Faculty Research Mentor: Scott DiGiulio, Classical & Modern Languages & Lit
Funding: None | **Project Category:** Humanities

Tricky Tales: Comparing Samson & Odysseus in Greek Narratives
Deception, trickery, and divine favor. These descriptors may recall various fantastical tales, such as the stories of Odysseus and Samson. While these two tricksters of the Mediterranean have much in common, little work has been done examining their similarities, though previous work has compared Samson and the Greek hero Herakles due to their shared divine strength (Gnuse 2018). Samson's story is not defined by strength alone, rather trickery and deception are also recurring themes, just as in the story of Odysseus. By comparing the heroic and trickster natures of the two protagonists, I will demonstrate similarities between the two tales and characters. These similarities may support the assumption of a broader cultural exchange between early Israel and early Greek cultures.

#230 - Greene, Victoria

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Michael Sandel, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Marcus Drymon, Kayla M. Fast, Marcus Drymon, Michael W. Sandel
Funding: None | **Project Category:** Biological and Life Sciences

Microplastic and Mesoplastic Quantification in Cartilaginous Fishes of the Northern Gulf of Mexico
Humans produce approximately 460 million metric tons of plastic waste annually. It is estimated that approximately 8 million metric tons of plastic enter our oceans each year. Microplastics are plastics <5 mm in diameter. Microplastics are becoming a greater concern because they can be found virtually everywhere, including food, air, plants, and corals. These plastics have a high affinity for heavy metals and may absorb them. Since microplastics are immobile, they are easy targets for consumers. This sparks the question of how these microplastics affect organisms and how microplastics move through the trophic levels. To understand the complex relationships between trophic levels and microplastics, we collected the lower intestines, sections of the gills, stomach contents, and embryos of cartilaginous fishes caught at Deep Sea Fishing Rodeos in the northern Gulf of Mexico. Collections included rays (n = 8) and sharks (n = 26). Microplastics were extracted from tissues using KOH organic digestion and isolated via filtration. The amount of microplastics in the organs of cartilaginous fishes was quantified using a light microscope. In the analyzed samples, numerous microplastics were found in each sample. The most abundant microplastic category in each sample is microfibers. This could be due to ingesting fishing line during capture times (fishing).

#099 - Greenwood, Kaitlyn

Major: Business Administration - Bachelor of Business Adm
Faculty Research Mentor: Michele Craven, Management & Information Systems
Co-Author(s): Alyssa Bevacqua, Kaitlyn Greenwood, Taylor Shackelford, Maria Bracamonte
Funding: College of Business Dean's Office | **Project Category:** Business and Economics

The Taffer Effect: Using Televised Organizational Interventions to Study Crisis Management

Founder leadership style acts as the primary catalyst for both crisis and recovery in small businesses lacking formal managerial hierarchies. Drawing on a multi-case analysis of three televised organizational interventions (Bar Rescue), this research examines two family-owned bars and one non-family bar to highlight how the founder emerges as a structural bottleneck. In these cases, leadership style serves as the organizational infrastructure, shaping operational discipline, conflict norms, and the organization's ability to respond to distress. Identity fusion—founders closely tying their personal worth to the business—triggers volatile emotional reactions to failure that were further intensified in the family firms. This psychological dynamic drove workplace mistreatment, which functioned as an escalating force across all three cases. In the absence of middle management, workplace bullying became the primary expression of frustration, power struggles, and relational tensions, eventually manifesting as visible service failures. The study identifies the high-confrontation, expert-led intervention (the "Rescue") as the external force capable of imposing accountability. By forcing an unavoidable confrontation between the founder and their operational failures, the intervention compels founders to acknowledge their role in the crisis, assume accountability for the consequences, and accept both relational and operational reforms. Ultimately, all three firms, family and non-family alike, were built around a founder whose leadership style created the same underlying structural vulnerability, with family involvement heightening the emotional intensity of conflict. The televised intervention serves as a unique catalyst for breaking defensive leadership patterns, enabling founders to shift their behavior, accept change, and begin organizational recovery.

#231 - Guo-Yue, April

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Carl June, University of Pennsylvania Center for Cellular Immunotherapy
Co-Author(s): Ebony Smith, Regina Young
Funding: Uni. of Pennsylvania Summer Undergraduate Internship Program | **Project Category:** Bio and Life Sciences

Determining the Impact of IL-12 and IL-18 Treatment on CAR-MAIT Cell Anti-Tumor Response

CAR-T cell therapy has revolutionized the treatment of hematological malignancies. However, it's efficacy against solid tumors remains limited due to the immunosuppressive tumor microenvironment (TME), poor T-cell trafficking, and CAR-T cell exhaustion. Mucosal-associated invariant T (MAIT) cells are a promising alternative capable of overcoming these challenges due to their ability to rapidly respond upon activation, differential tissue-homing profile, and effector memory phenotype. In this study, we investigated the potential of mesothelin-specific CAR-MAIT cells, which combine the tumor-targeting precision of CAR-T cells with the innate advantages of MAIT cells, to enhance antitumor efficacy against mesothelin-expressing pancreatic adenocarcinoma cells (ASPC-1) when treated with IL-12 and IL-18 in vitro. CAR-MAIT cells were generated by lentiviral transduction of $V\alpha7.2^{+}CD161^{+}$ T-cells, and CAR surface expression was confirmed through flow cytometry using an anti-scFv antibody. Real-time cytotoxicity against ASPC-1 targets was measured using xCELLigence RTCA, which measures cellular impedance as an indicator for tumor cell viability. We found that CAR-MAIT cells co-cultured with IL-12 and IL-18 exhibited greater ASPC-1 tumor cell clearance and enhanced expression of granzyme B, perforin, IFN-γ, and CD69 compared to untreated controls. These findings support our hypothesis that co-treatment with IL-12 and IL-18 enhances CAR-MAIT cell functionality in vitro. Ongoing and future studies will evaluate these findings in murine models to assess in vivo efficacy, optimize cytokine dosing, and identify safety profiles. This work lays the foundation for developing CAR-MAIT cell therapy as a novel strategy to overcome barriers limiting CAR-T cell efficacy in solid tumors.

#029 - Gutierrez, Amanda

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Jessica Pattison, School of Human Sciences
Co-Author(s): Adrian Sescu
Funding: Shackouls Honors College Research Fellowship, ORED Undergraduate Research Program, Mississippi State Space Grant Consortium | **Project Category:** Engineering

From Farm to Space: Evaluating Sericulture-Derived Silk for Sustainable Spacesuit Design

Spacesuit design continues to evolve as advances in fiber technology address the extreme conditions of space—dust, radiation, and vacuum—while responding to global imperatives for sustainability and adaptability. Traditional protective materials such as expanded polytetrafluoroethylene (ePTFE) and beta fibers offer high performance but remain limited by cost, environmental impact, and rigidity. This study explores sericulture-derived silk as a sustainable, high-performance fiber for future spacesuit applications through a farm-to-fiber proof of concept. 250 Bombyx mori silkworms were reared in a controlled laboratory environment to evaluate the feasibility of silk production under managed conditions. Following degumming and fiber extraction, methods commonly used in aerospace materials testing were used. Mechanical and thermal testing of the silk and its blends were conducted and analyzed for spacesuit compatibility alongside measuring dimensional stability, burn thresholds, structural degradation, evaluating tensile strength, abrasion resistance, strain performance, and chemical durability. This controlled-environment rearing attempted to mirror NASA's agricultural testing protocols for extraterrestrial habitats, linking terrestrial silk production with experimental systems designed to simulate lunar laboratory and Martian conditions. By connecting these insights with emerging biotechnologies—such as the genetic modification of silkworms to replicate spider-silk properties—the project demonstrates how value can be added to natural fibers through sustainable innovation. Preliminary findings suggest that while tensile strength and durability require further investigation, the inherent resilience, flexibility, and comfort properties of silk position makes it a viable candidate for technical and protective textiles. Ultimately, this research bridges aerospace engineering, fashion design, agricultural science, to envision a future where fibers grown on Earth may sustain human life beyond it.

#232 - Haines, Emma

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Sandra Correa, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Camren Fraser, Camren Fraser, Sandra Correa, Leandro Miranda
Funding: College of Forest Resources URSP | **Project Category:** Biological and Life Sciences

Image-Based Morphometric Analysis to Estimate the Weights of Largemouth Bass (*Micropterus nigricans*)

Physically sampling fish communities can be a costly and time-consuming process, but it is necessary. Many agencies may not have the resources to closely monitor individual fisheries, leading to potential delays in needed management. Remote monitoring of these ecosystems could greatly bolster an agency's resources. Citizen science programs can be invaluable for building these long-term datasets but can be subject to variable data due to changeable equipment and measurement methods. I propose a way to conduct these activities for Largemouth Bass (*Micropterus nigricans*), a popular sportfish across the United States, with the use of image-based morphometric analysis. To test this method, sampling was done using boat electroshocking in six reservoirs in Northeast Mississippi. A total of 338 Largemouth Bass ranging from 100 to 595 mm in length were photographed, measured, and weighed. Ten anatomical landmarks and a standard equation were proposed for weight estimation. A portion of the landmarks were used to create two polygons accounting for the shape of the fish. The random Forest package in R produced r2s of 0.9912 and 0.9461 for fish 10-300 g and 300-1000 g respectively. In general, the model tended to overestimate lighter fish and underestimate heavier fish. Further research can be done to explore other landmarks that may reduce landmarker bias and increase reliability. As well as looking into seasonal variations. In the future, similar image-based weight estimation techniques could be developed for a variety of species. This proposed method could also be paired with a web application allowing anglers to submit pictures directly to fish managers, resulting in remote monitoring of fisheries with minimal cost and effort.

#233 - Hall, Ethan

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Peixin Fan, Animal & Dairy Science
Co-Author(s): Himani Joshi, Himani Joshi, Brian Rude, Chuan-Yu Hsu
Funding: USDA | **Project Category:** Biological and Life Sciences

Recovery of High-Quality Metagenome-Assembled Genomes from in Vitro Cultures of Bovine Rumen Fluid Using Long-Read Metagenomic Sequencing

The rumen microbiota comprises a highly diverse and dynamic community of microorganisms that play essential roles in the digestion and metabolism of complex plant materials in ruminant animals. Despite their importance, a large proportion of these microbes remain uncultured, limiting our understanding of their functional potential. Recent advances in high-throughput sequencing and metagenomic assembly have enabled the reconstruction of microbial genomes directly from rumen fluid samples. However, these approaches may fail to recover genomes from low-abundance taxa due to limited sequencing depth or assembly challenges. To overcome these limitations, we employed an in vitro culture system combined with long-read sequencing to support the growth and enrichment of the rumen microbial community. This approach potentially facilitates the proliferation of both dominant and rare taxa, thereby improving their representation in genome assemblies. Three rumen fluid samples were initially collected from canulated beef cattle and were cultured in vitro at 39 °C for 48-hour with CO2 flushed and artificial saliva buffer supplemented at 0 hour. Rumen fluid samples were collected at hours 0, 4, 12, 24, and 48, and used for DNA extraction and long-read metagenomic sequencing on MinION flowcell on GridION sequencer. The filtered non-host reads (average N50 = 5.2 kb) of the five samples were then merged and assembled using Flye with the -meta parameter. The assemblies were polished using Racon and Medaka and binned using the MetaBAT2. Eighteen high-quality metagenome-assembled genomes (completeness > 90% and contamination < 5%) were obtained, including several underrepresented species in the NCBI database, such as Corynebacterium vitaeruminis and Comamonas kerstersii, for which only four and eighteen assembled genomes are available in the NCBI database, respectively, as well as seven unclassified species. The findings from this study contribute to expanding genomic resources and improving our understanding of the functional potential of the rumen microbiome.

#234 - Hallett, Samantha

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Peter Allen, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Courtney Webber, Abby McGregor, Marcus Drymon, Peter Allen
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Seasonal Changes in Blood Ion Concentrations of Elasmobranchs in the Northern Gulf of Mexico

Fishes are closely adapted to their environments, and seasonal changes in temperature, salinity, and other abiotic factors can alter blood ionic concentrations. However, little is known about seasonal ionic changes and osmoregulation in northern Gulf of Mexico elasmobranchs. Therefore, we collected 0.5-1 mL of blood from the caudal vein of Gulf elasmobranchs over a period of 8 months with environmental conditions encompassing summer, fall, winter, and spring seasons. A total of 228 blood samples were collected from 19 species, with the 5 most common being Atlantic Sharpnose Shark (Rhizoprionodon terranovae) (n=85), Tiger Shark (Galeocerdo cuvier) (n=23), Blacknose Shark (Carcharhinus acronotus) (n=23), Spinner Shark (Carcharhinus brevipinna) (n=17), and Smoothhound Shark (Mustelus sp.) (n=16). Additionally, there were 64 samples from 14 other species. It was hypothesized that blood ion concentrations would change with seasonal differences in temperature and salinity. Results will be discussed in the context of management of northern Gulf of Mexico elasmobranchs.

#142 - Hamilton, Gwendalyn

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: None | **Project Category:** Social Sciences

Relation Between Chronic Illness and Quality of Life: Moderation by Psychological Problems and Illness Acceptability

Emerging adulthood is a developmental period characterized by identity exploration, increasing independence, and evolving health responsibility. Managing a chronic illness during this time may disrupt psychosocial adjustment and overall well-being. The present study examined whether psychological problems and illness acceptability moderate the relationship between chronic illness and quality of life among emerging adults. Participants were 597 individuals aged 18–25 who completed measures of chronic illness status, psychological problems, illness acceptability, and quality of life. Moderation analyses using PROCESS Model 3 indicated that chronic illness alone was not a significant predictor of quality of life. However, greater psychological problems were associated with lower quality of life, whereas higher illness acceptability was associated with better quality of life. Significant interaction effects revealed that psychological problems intensified the negative association between chronic illness and quality of life, while illness acceptability attenuated this association. The three-way interaction was not significant. These findings suggest that psychological functioning and acceptance processes play a critical role in shaping quality of life outcomes among emerging adults managing chronic illness and highlight potential targets for psychosocial intervention during this pivotal developmental stage.

#143 - Hamilton, Lauren

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: None | **Project Category:** Social Sciences

Relation Between Maternal Psychological Aggression and Psychological Problems in Emerging Men and Women Mediated by Coping Strategies

Throughout emerging adulthood, early family experiences significantly impact emotional and behavioral outcomes. Difficulties in regulating emotions and coping through avoidance have been linked to greater psychological distress (Boadalski et al., 2019: Panayiotou et al. 2021). Emerging adults' ability to use adaptive coping strategies becomes particularly important as they begin to rely more on peer and romantic relationships (Oliveira et al., 2020). Maternal psychological aggression could interfere with the psychological development of this adaptive coping in emerging adults, which could increase their reliance on maladaptive coping strategies like disengagement coping and could contribute to later psychological problems. The current study examined whether engagement coping and disengagement coping mediate the relation between maternal psychological aggression and psychological problems in emerging adults, and whether these pathways differ by gender. Participants consisted of 430 emerging adults aged 18-25 (M = 18.73, SD = 1.22). The sample included 69.3% women and 30.7% men; racially, 79.7% were Caucasian, 15.4% African American, 1.4% Hispanic, 1.2% Asian, and 2.3% Other. Participants completed the Psychological Aggression subscale of the Conflict Tactics Scale, the Engagement and Disengagement Coping Scales, and the Adult Self-Report. Moderated mediation analyses were conducted using PROCESS 4.2 (Hayes, 2022) Model 59.
Maternal psychological aggression was associated with greater psychological problems for both women (B = 0.89, p = .001) and men (B = 0.55, p = .002). Engagement coping marginally predicted fewer psychological problems (B = -0.21, p = .052), whereas disengagement coping significantly predicted more psychological problems (B = 0.34, p < .001). Bootstrapped analyses indicated that disengagement coping mediated the association between psychological aggression and psychological problems for men (B = 0.31, 95% CI [0.14, 0.50]), but not for women.
These findings suggest that interventions targeting maladaptive coping strategies like disengagement could help in reducing psychological difficulties during development in emerging adulthood.

#235 - Hansen, Parker

Major: Nat Res & Envir Conservation - Bachelor of Science
Faculty Research Mentor: Courtney Siegert, FWRC - Forestry
Co-Author(s): Waqar Shafqat, W. Cade Booth, Austin Himes, Heidi Renninger
Funding: College of Forest Resources URSP | **Project Category:** Biological and Life Sciences

Soil Microbial Amendments Alter Root Structure Across Six Poplar Genotypes
Poplar species are ideal woody bioenergy crops, due to their fast growth rates. In these production systems, trees can be harvested through coppicing at 2-3 year intervals, leaving intact root systems that enhance belowground carbon sequestration. Recent field trials have demonstrated that soil microbial amendments with endophytes have the potential to enhance productivity and provisioning of ecosystem services. In order to better understand these relationships, we excavated and destructively sampled the root systems of 36 trees across six poplar genotypes, half of which were inoculated with endophytes at the start of a field trial four years ago. Currently, roots are being cleaned and categorized based on root diameter (fine: <2mm, small: 2-5mm, medium: 5-10mm, large: >10mm). In addition to destructive root sampling, total belowground biomass and biomass partitioning across varying root sizes is also being determined. Preliminary results from twelve trees indicate that trees inoculated with endophytes exhibited more roots of smaller diameter classes, while trees with no endophyte inoculation exhibited more roots of larger diameter classes. These differences in overall root structure led to slight differences in belowground biomass partitioning, with trees inoculated with endophytes exhibiting more mass in smaller root diameter classes, while trees with no endophyte inoculation exhibited more mass in larger root diameter classes. We are finding strong correlations between above- and belowground biomass, which can inform our prediction of total stand biomass and carbon allocation.

#144 - Harrell, Cayley

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: None | **Project Category:** Social Sciences

Family Dysfunction Relating to Psychological Problems with a Moderating Factor of Emotional Dysregulation
When Papero and Daniel (2024) study family emotional regulation, they analyze families as a balanced system. When faced with challenges, family dysfunction, and extreme emotions is more likely. Families who have children with Attention-Deficit Hyperactivity Disorder (ADHD) are more likely to experience dysfunctional parenting. Miller et al. (2022) found interventions for parent-child relations should focus on behavioral regulation, cognitive difficulties, and parental mental health. Schorr-Sapir et al. (2022) conducted a study to improve parental emotional regulation and regulate ADHD symptoms. Results showed that when children behaved better, their parents responded more calmly and positively. Participants included 736 emerging adults with ages ranging from 18 to 28 years ($M = 18.84$, $SD = 1.40$). Participants reported on their gender (61.0% women, 36.5% men) and race (77.9% White, 15.6% Black, 2.3% Asian or Asian American, 3.7% other). The Adult Self-Report (Achenbach & Rescorla, 2003) was used to report psychological function. Participants reported any difficulties with managing emotions using the Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004). Family dysfunction was measured with the Family Assessment Device (Epstein et al., 1984). PROCESS 2.4 (Hayes, 2022) model 1 was used to conduct a moderation analysis. The model used to predict psychological problems was significant, $R^2=.50$, $F(3, 732) = 202.80$, $p < .001$. Family Dysfunction was positively associated with psychological problems, $B = 8.77$, $SE = 1.82$, $p < .001$. Emotional Dysregulation was associated with psychological problems, $B = 0.77$, $SE = 0.04$, $p < .001$. The interaction between family dysfunction and emotional dysregulation significantly predicts psychological problems, $B = 0.12$, $SE = 0.05$, $p = .03$. This current study examined whether family dysfunction was related to psychological problems and how it was moderated by emotional dysregulation. The results found that family dysfunction relates strongly to psychological problems when emotional dysregulation is high.

#236 - Heck, Malena

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Marcus McGee, Animal & Dairy Science
Co-Author(s): Cierra Clayton, Emma Hartley, Christopher Hudson
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Assessing Self- and Social-Grooming Dynamics as Potential Behavioral Biomarkers of Estrus in Precision-Managed Dairy Herds

Understanding how affiliative or maintenance behaviors shift during reproductive status can enhance monitoring of estrus expression in dairy herds. This study aimed to evaluate whether self-grooming and social grooming behaviors are associated with estrus expression in dairy cows. Behavioral data were collected from ten freestall housed lactating Holstein cows. Prior to trial initiation, cows were synchronized using a one-shot Prostaglandin F2 alpha protocol. Continuous video was recorded over a seven-day period using a CCTV media system. Individual brush use and allogrooming events were annotated using the BORIS behavioral analysis software and an ethogram-based framework that documented start and stop times, anatomical modifiers (e.g., head, shoulder, flank), and directional components of social grooming (providing = PRV; receiving = REC). Behavioral estrus was concurrently scored from daily observations of mounting, standing to be mounted, chin resting, sniffing, and restlessness. A daily estrus activity score was calculated as the sum of these behaviors by cow and merged with brush and allogrooming metrics. Total durations and frequency counts were aggregated for assessment with estrus activity. Correlations ($r = 0.86$ - 0.90; $p < 0.001$) were observed among classical estrus behaviors, including standing to be mounted, being mounted, chin-resting, and tailside mounting. Brush use demonstrated a mild but positive correlation with estrus activity ($r \approx 0.33$; $p < 0.01$), suggesting intermittent engagement in self-grooming during periods of increased social and locomotor activity. In contrast, both providing and receiving allogrooming behaviors were not correlated with estrus scores ($r = -0.06$ to 0.06; $p > 0.50$), indicating that social grooming frequency and duration were not reliable indicators of reproductive status. Directional differences in allogrooming (PRV vs. REC) did not influence this outcome, and anatomical modifiers (e.g., head rub vs. flank) revealed no consistent trends. These findings suggest that social grooming behaviors remain largely independent of reproductive status.

#030 - Henry, Jayla

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Uilson Martins, Agricultural and Biological Engineering
Co-Author(s): Vitor Martins
Funding: None | **Project Category:** Engineering

Automatic Detection of Concentrated Animal Feeding Operations in the Midwest Using YOLO and NAIP Imagery

Concentrated Animal Feeding Operations (CAFOs) are major agricultural facilities that house livestock in the U.S. These facilities contribute to the nation's demand for eggs, dairy, and meat, generating jobs and revenue across several sectors of the economy. Despite the importance of these operations, datasets of their locations remain sparse. Knowing their locations is fundamental for food security, especially for surveillance and modeling disease outbreaks. The objective of this research project is to introduce a robust method for automatically detecting CAFOs using You Only Look Once (YOLO) object detection on high-resolution National Agriculture Imagery Program (NAIP) imagery (1-meter spatial resolution). We targeted four major CAFO operations (feedlots, dairy, poultry, and hogs) for label processing, distributed across 24 counties reported to have the highest animal inventories in the USDA Agricultural Census in the Midwest region. The YOLO model was trained using 14,585 hand-annotated labels derived from NAIP imagery. The annotations were grouped into 1024 × 1024 pixel patches, with individual patches potentially containing multiple labeled facilities. Non-CAFO patches were also included in the training process to avoid false positive detections with similar CAFO structures. Preliminary results demonstrated that the model achieved about 80% precision and 70% recall (mAP@0.5 ≈ 0.75) in detecting livestock facilities from aerial imagery, with most errors occurring when some facilities were confused with surrounding land cover or other agricultural structures that visually resemble CAFO operations. The detection of these facilities provides critical data for policymakers to develop strategies aimed at mitigating environmental impacts, improving animal welfare, and ensuring food security, as it provides support to early detection and monitoring of potential livestock disease outbreaks.
Keywords: CAFO facilities, high-resolution remote sensing, object detection, deep learning

#031 - Henson, Hannah

Major: Microbiology - Bachelor of Science

Faculty Research Mentor: David Van Den Heever, Ag & Bio Engineering
Co-Author(s): Zack Murphy, Lela Rose, Faith Garraway
Funding: ORED Undergraduate Research Program | **Project Category:** Engineering

The Effects of Hormonal Contraceptives on Emotional Processing Using Fast Periodic Visual Stimulation
Birth Control (BC) has been used for over 60 years by over 60 million women in the U.S. alone, yet there is a lack of evidence on how hormonal contraceptives effect emotional processing. The follicular and luteal phases of the menstrual cycle indicate key hormonal differences. The follicular phase causes estrogen levels to rise with increased motivation and positivity. The luteal phase's increase in progesterone causes opposite emotional effects, with some studies reporting a stronger response to negative stimuli during this phase. Fast Periodic Visual Stimulation (FPVS) was used to identify the brain's reactions to emotional images, paired with electroencephalography (EEG). 20 female participants were categorized as birth control users or ones with a natural cycle. Each woman participated during their follicular and subsequent luteal phase. Neutral expressions were displayed in a sequence, and depending on the emotional condition being presented, an angry, sad, or happy "oddball" expression appeared every fifth image. Expressions were compiled from 72 RADIATE database faces. EEG activity was recorded using a BIOSEMI Active-Two amplifier system. During the follicular phase, the control group showed a stronger response to the angry condition compared to the BC group ($p < .03$), but the BC group shows a trending increased response to the angry condition in the luteal phase when compared to its follicular phase ($p = .08$). Statistical analysis was conducted with a linear mixed model. Birth control use may be associated with reduced emotional sensitivity, but during the luteal phase, an originally blunted response can be triggered due to a variation in hormonal activity in response to negative stimuli. A larger sample size is needed to further the significance of these results. FPVS shows promise in revealing the effects that hormonal contraceptives can have on a woman's emotional response, and how they impact the brain overall.

#117 - Higgason, Bethany

Major: English - Bachelor of Arts
Faculty Research Mentor: Andrea Spain, English
Funding: None | **Project Category:** Humanities

The World According to Ethan Edwards: Ideology and Threshold in John Ford's *The Searchers*
My paper is an analysis of ideology and the way that it functions when looking at film as threshold in John Ford's Western film, The Searchers (1956). This film tells the story of Ethan Edwards (John Wayne) and Martin Pauley (Jeffrey Hunter) as they spend five years wandering the American West in search of Debbie (Natalie Wood), their niece/sister who was taken by a band of Comanche Natives in a brutal raid on their family's farm. Using Louis Althusser's essay "Ideology and the Ideological State Apparatus," this paper critiques the racist ideology portrayed by Ethan throughout the film through close readings of the portrayals of his assumptions about race, justice, and his own place on the frontier. Further, this paper demonstrates the way that Debbie's character reveals the cracks in his ideological fantasies. Finally, this paper uses close readings of thresholds between homes, geographical borders, and even caves to demonstrate the ideological work that must be done for Ethan to suture over the cracks in his fantasies and make sense of his ideological "laws".

#091 - Higginbotham, Tess

Major: Architecture - Bachelor of Architecture
Faculty Research Mentor: Aaron White, School of Architecture
Funding: CAAD C/REU program | **Project Category:** Arts, Music, & Design

Drawing as Pedagogy in Architectural History
Dr. Michael Fazio was a founding professor for Mississippi State University's School of Architecture and taught at the school for thirty-one years. During his tenure, Fazio ran design studios, wrote significant teaching materials for architectural education like Buildings Across Time and World History of Architecture, and taught History of Architecture courses. A unique aspect of Dr. Fazio's history teaching was his use of drawings and drawing manuals as pedagogical tools. This research examines Dr. Fazio's History of Architecture Drawings Manuals—a series of three volumes Dr. Fazio organized for teaching architectural history. Each "manual" is about 250 pages of drawings for buildings that were a part of Fazio's curriculum for his three successive History of Architecture courses. The manuals stick out as anomalies in current architectural history education. Drawings are significant tools for architects, cornerstones of our work even. But many history class curriculums are an observation style pedagogy. Dr. Fazio challenges this model, insisting that one can learn to truly "see" a building by learning to draw it. With so much generational opposition in pedagogical values for architecture—most notable the École des Beaux-Arts versus Bauhaus debate—Dr. Fazio's teaching method incites a broader question: What constitutes a complete education in architecture? By examining the chosen projects and figures in a respected professor's curriculum, could one begin to understand what is—from a historian's point of view complete architectural education? What values and design fundamentals can be learned through examination of the past?

#107 - Hilbun, Johanna

Major: Kinesiology - Bachelor of Science
Faculty Research Mentor: Leo Chen, Department of Kinesiology
Co-Author(s): Megan Holmes, Po-Lin Chen, John Lamberth, Megan Holmes
Funding: None | **Project Category:** Education

Perceived Balance, Physical Function, and Body Composition in Active Older Adults: A Preliminary Analysis
Introduction: Fall risk increases with age due to body composition and fitness changes. The links among perceived balance, body composition, and physical function require additional investigation. This preliminary analysis examined the correlation between perceived balance, physical function, and body composition in older adults (OA). **Methods:** Twelve (9 females) older adults, aged 68.69 ± 5.04, took part in this study. A self-reported Balance Confidence Scale was used to assess perceived balance confidence. Participants were then dichotomized into high- and low-confidence groups using a median split of the total scale score. Dual-Energy X-ray Absorptiometry and Bioelectrical Impedance Analysis were used to measure bone mineral density and body composition. The Senior Fitness Test was performed to measure physical function. Pearson Correlation Coefficient analysis was used to evaluate variable correlations. Significance level was set at $\alpha = .05$. **Results:** In low-confidence OA, significant correlations were found between skeletal muscle mass and right ($r = .786$; $p = .021$) and left ($r = .852$; $p = .007$) grip strength, agility and dynamic balance ($r = -.831$; $p = .011$), and bone mineral density ($r = .826$; $p = .012$) as well as between agility and dynamic balance and aerobic fitness ($r = -.818$; $p = .013$). Balance confidence was found to be significantly correlated with right ($r = -.902$; $p = .002$) and left ($r = -.872$; $p = .005$) arm strength in the low-confidence group. Among high-confidence OA, agility and dynamic balance was significantly correlated with lower body strength ($r = -.968$; $p = .032$) and body fat percentage ($r = .962$; $p = .038$). **Conclusion:** Perceived balance was correlated with upper-body strength in low-confidence OA. No correlation among perceived balance, physical function, and body composition was found in high-confidence OA. Therefore, perceived balance should not be an indicator of physical function in OA.

#032 - Hoff, Austin

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Jeremy Hopwood, Aerospace Engineering
Co-Author(s): Calvin Walker, Tucker Jaudon
Funding: Department of Aerospace Engineering | **Project Category:** Engineering

Design, Manufacturing, and Testing of a Data Acquisition System for Use in the Development of Control Systems for Fixed-Wing Unmanned Aerial Systems

Accurate flight control of fixed-wing unmanned aerial systems (UAS) requires understanding how the aircraft responds to control inputs. System identification provides this understanding by estimating mathematical models of aircraft dynamics from measured input-output data. Reliable model estimation depends on precise, high-rate, and time-synchronized measurements of aircraft states and control inputs, as well as sufficient dynamic excitation to ensure that all relevant modes of the aircraft are observed. Errors in timing, low sampling rates, or incomplete sensor data can bias parameter estimation, degrading model accuracy and limiting the performance of flight controllers. In practice, conventional autopilot platforms are constrained by low sampling rates, limited sensor access, and inconsistent timing. As a result, the collected data often lacks the fidelity required for rigorous system identification, making it challenging to develop accurate models for control design and tuning. To address these limitations, a dedicated data acquisition system (DAS) was designed, manufactured, and experimentally validated specifically for fixed-wing UAS applications. The system enables high-rate logging of inertial, navigation, and actuator signals with precise timing alignment. This ensures accurate capture of the input–output relationships necessary for dynamic model estimation. By improving sampling rates, synchronization, and overall data quality, the developed DAS enhances both the accuracy and reliability of system identification results. The resulting high-fidelity models provide a foundation for developing, validating, and tuning of advanced flight control systems. Their use ultimately improves the performance, predictability, and robustness of fixed-wing UAS operations, supporting more reliable and efficient autonomous flight.

#033 - Hoffmann, Luca

Major: Computer Engineering - Bachelor of Science
Faculty Research Mentor: Christopher Hudson, Computer Science and Engineering
Co-Author(s): Daniel Carruth, Timothy Sellars
Funding: CAVS | **Project Category:** Engineering

Containerized ROS2 Deployment of the NATURE Stack for Small-Scale Off-Road Autonomy

Off-road autonomous navigation benefits from platforms that support rapid iteration across sensing, perception, and planning. Our small-scale autonomy system has undergone several redevelopment cycles, beginning with an initial ROS1 version, followed by a ROS2 platform using the publicly available navigation stack, and now a new generation that integrates the CAVS NATURE Autonomy Stack in ROS2. This progression reflects ongoing efforts to improve outdoor sensing performance, computational efficiency, and overall system reliability. Earlier versions of the platform faced limitations with depth sensing. The RealSense L515 was unable to operate effectively outdoors due to sunlight interference, and the subsequent OAK-D SR camera provided improved robustness but only short-range depth perception. The current version transitions to the Intel RealSense D435i, combined with an NVIDIA Jetson Orin Nano, an Aceinna OPENRTK330LI IMU, and a VESC-based drive system. This configuration provides more reliable depth data and supports the perception and planning pipeline required by the NATURE autonomy stack. A significant update in this generation is the adoption of a Podman-based container architecture. Running autonomy components, sensor drivers, and ROS2 nodes in isolated containers simplifies deployment, increases system flexibility, and supports educational use by allowing students to experiment with individual modules without affecting the host environment. The goal of this redevelopment effort is to adapt the NATURE autonomy stack, originally designed for full-scale and medium-scale vehicles, to a 1/10 scale platform with strict size, weight, power, and computing constraints. Initial integration and sensor tests indicate that this approach is feasible and capable of supporting small-scale off-road autonomy. These results highlight the value of small-scale platforms as low-cost and high-iteration testbeds for continued development of the NATURE stack across all scales.

#034 - Hoffmann, Martina

Major: Computer Engineering - Bachelor of Science
University: Starkville High School
Faculty Research Mentor: Christopher Hudson, Computer Science and Engineering

Co-Author(s): Daniel Carruth, Christopher Goodin, Jordon Jasper
Funding: CAVS | **Project Category:** Engineering

Localization Performance Analysis of LiDAR-Based SLAM for Autonomous Off-Road Vehicles in Simulation
Accurate localization is critical for autonomous vehicles operating in off-road environments, particularly in GPS-denied conditions. In these situations, understanding the precision and reliability of alternative localization methods is essential. This work evaluates the localization accuracy of multiple LiDAR-based simultaneous localization and mapping (SLAM) methods running on a simulated Polaris mrzr in a digital twin of the CAVS proving ground. Three types of movements were evaluated: stationary, loop, and trajectory, to assess localization performance. The stationary task consisted of ten-minute trials in which the vehicle remained stationary at three locations replicated from real-world environments. The loop task involved driving the vehicle along a closed path with identical start and end points to evaluate localization consistency across repeated traversals. The trajectory task required the vehicle to follow a predefined route from point A to point B. For all scenarios, multiple SLAM algorithms were used to estimate the vehicle's position, enabling a comparative analysis of localization performance across the different methods.

#145 - Holladay, Grant

Major: Foreign Language - Bachelor of Arts
Faculty Research Mentor: Justin Pinta, Classical & Modern Languages & Lit
Funding: None | **Project Category:** Social Sciences

The Mississippi Gulf Coast's Lost Tongue: The Vestiges of French in Coastal Mississippi
The Mississippi Gulf Coast holds a unique historical identity due to its French and Spanish influence. Waves of migration from various groups culminated in a distinct variety of French known as Mississippi Gulf Coast French (MGCF). However, the Mississippi Gulf Coast underwent a massive linguistic shift from French to English beginning in the 1920s. This intergenerational shift resulted in the last generation of MGCF speakers. This study hopes to document the vestiges of MGCF through semistructured interviews of speakers in and around Kiln, Mississippi. It seeks to analyze the role that race, religion, education, socioeconomic background, and identity play in the maintenance and shift of MGCF.

#146 - Hollinger, Chelsey

Major: Microbiology - Bachelor of Science
Faculty Research Mentor: Danielle Nadorff, Psychology
Funding: None | **Project Category:** Social Sciences

Control, Care, and the Consequences: Parenting Styles as Determinants of Young Adult Mental Health Outcomes
Anxiety, stress, and depressive symptoms are highly prevalent among emerging adults, particularly during the transition to college, which is a period marked by significant developmental and environmental change. Prior research often links parenting style to mental health outcomes, but few studies focus on how different caregiving styles may affect these outcomes. The present study examines whether caregiving type (kinship versus parental) moderates the association between perceived parenting style and current mental health outcomes (anxiety, stress, and depressive symptoms) in emerging adults aged 18-25. Supported by attachment theory, family stress model, and ecological systems theory, this study examines how early caregiver relationships, caregiver stressors, and broader environmental contexts influence psychological well-being in adulthood. It is hypothesized that more authoritarian parenting styles will be associated with worse mental health outcomes, and that this association will be stronger among individuals raised in kinship care compared to those raised by biological parents. Findings from this study aim to contribute to a more nuanced understanding of how caregiving context interacts with parenting style to influence mental health during emerging adulthood and may help to inform future research and interventions for individuals from non-traditional family structures. Data is currently being collected through a survey to be used in the formation of an analysis presented at the symposium.

#237 - Horner, Amelia

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Murry Burgess, FWRC - Wildlife, Fisheries & Aquaculture
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Biological and Life Sciences

A Comparative Study of Avian Response to Post-Wildfire Changes in Sequoia National Park

The primary goal of this research was to conduct a comprehensive and time-specific avian species survey in the Giant Forest and Lodgepole regions of Sequoia National Park. Over the course of 60 days, detailed field observations were recorded to create a current dataset of bird species composition, diversity, and density in this area. This dataset was then compared with biodiversity records from the past decade, including eBird and National Park Service databases in order to assess how avian communities have changed over time, particularly in response to the 2020 Castle and 2021 KNP Complex wildfires. The resulting analysis provides a valuable baseline reference for long-term monitoring and will lead to an academic research poster and honors thesis presentation examining my findings.

Birds, as indicators of environmental health, revealed significant shifts in Sequoia's post-fire ecosystem. This research documented changes in both species presence and abundance within the Giant Forest and Lodgepole areas, offering insights into how recovery dynamics affected avian biodiversity. Species richness showed early signs of rebound in some habitats focused in the Giant Forest, while others in the Lodgepole region displayed reduced diversity linked to burn severity, canopy loss and vegetation loss. These results align with broader studies conducted in other parts of the Sierra Nevada, which suggest that avian communities adapt to post-fire landscapes through shifts in guild composition and resource availability. The findings show the importance of long-term monitoring in protected areas to inform future conservation strategies across the region. The project's completion reflects the researcher's growing expertise in field methods, data analysis, and applied conservation science. Surveys were conducted using non-invasive, twice-daily auditory and visual sampling methods, supported by tools such as a Kestrel Weather Meter, a Garmin GPS unit, and a field guide on the birds of California for accurate identification. All field data is in the process of being digitized and analyzed in R and ArcGIS Pro to visualize patterns in species distribution and abundance. By comparing results across different park regions, including areas of Sequoia National Forest and Kings Canyon National Park, the study provides a broader ecological context for understanding Sequoia's recovery after the wildfires. Ultimately, this project contributes meaningful insight into how climate and disturbance shape avian diversity in California, while laying the groundwork for future research in post-disturbance ecology and conservation planning.

#238 - Horstead, Adrian

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Kristine Evans, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Zoë Scott, Emily Jo Williams, David Wiedenfeld
Funding: College of Forest Resources URSP | **Project Category:** Biological and Life Sciences

Evaluating the Establishment of Artificial Snags as Supplemental Nesting Structures for Cavity Nesting Bird Species in Working Southern Pine Forests

A significant proportion of the southeastern United States is comprised of working pine forests, often managed in short rotations (25-35 years). These forests can provide key habitats for an array of wildlife species, including the red-headed woodpecker (*Melanerpes erythrocephalus*; RHWO). RHWOs are primary cavity-nesting birds that will excavate nests in standing dead pine trees (snags) left as residuals by forest managers. Many other species can later utilize these cavities for nesting and other purposes, making the RHWO an ecologically significant species. North American RHWO populations have declined across the species' range in the last 60 years, and conservation efforts are underway to understand and support the species and its ecological role. Supplemental and artificial nesting structures have been implemented across various landscapes for other bird species of conservation concern (e.g., purple martin houses). There is potential for establishing artificial nesting structures to supplement RHWO populations in areas where management has reduced the availability of snags. In this study, we deployed 29 untreated utility poles on five recently harvested and replanted loblolly pine stands. The deployment occurred from 2024 to 2025 in two working southern pine forests in east-central Mississippi. The poles were established in five replicates of one cluster of four poles and one solitary pole on opposite sides of each stand, with the exception of two solitary poles and one pair. We

assessed avian communities, evidence of excavation/foraging, and associations with pole clustering and landscape configuration. We monitored each pole and site on a biweekly basis. Preliminary findings suggest RHWOs are present in the areas surveyed and interact with poles through foraging and cavity excavation, with the majority of excavation activity being observed in the clusters. Our findings can inform best management practices for snag retention/supplementation and enhance bird conservation in working pine landscapes.

#035 - Hunter, Kyla

Major: Industrial Engineering - Bachelor of Science
Faculty Research Mentor: Jean Mohammadi-Aragh, Electrical and Computer Engineering
Funding: None | **Project Category:** Engineering

Expanding Access to Engineering Education Through Structured Support Programs

Engineering education is often presented as a pathway to economic mobility and innovation, yet access to success within these programs is not equally distributed. Students from underrepresented, low-income, single parent, and first-generation backgrounds frequently encounter barriers that extend beyond the classroom, including limited access to mentorship, financial instability, and a lack of academic preparation due to unequal educational opportunities. These external factors can significantly influence retention and persistence in engineering programs. As a result, many capable students leave engineering not because of a lack of ability, but because of structural challenges that affect their ability to fully engage in rigorous academic environments. Programs designed to support students during the transition into college, such as the Summer Bridge Program, have emerged as important interventions that can improve student success and retention in engineering disciplines. These programs often provide early exposure to college-level coursework, mentorship, academic resources, and community-building opportunities that help students develop confidence and belonging within engineering programs. This research explores how external socioeconomic and social factors shape engineering education outcomes and examines the role that structured support programs play in mitigating these challenges. Understanding these relationships can inform the development of more equitable educational systems that expand access and persistence in engineering fields.

#147 - Hupe, Regan

Major: Human Development & Family Sci - Bachelor of Science
Faculty Research Mentor: Minel Guler, School of Human Sciences
Co-Author(s): JuYoung Lee, Jordyn Robinson, Shelby Lofton, Leah Dawkins, Aiden Brown
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Social Sciences

How Does the Anxious PreOccupied Attachment Style Affect the Impulse Buying Behaviors of College Students?

The study aims to explore the relationship between anxious-preoccupied attachment style and impulse buying behavior in college students. The attachment theory argues that relationships with primary caregivers during one's early stages of development play a critical role in one's emotional well-being and coping mechanisms over time. People with anxious-preoccupied attachment styles tend to be prone to fear of abandonment, emotional vulnerability, and need for validation. Since emotional validation may not always be available in one's environment, one may seek emotional validation through other means like material things. In settings like college campuses that are consumeristic in nature, anxious-preoccupied attachment may lead to impulse buying behavior. Although research has already established that emotional issues lead to impulse buying behaviors, few studies have been conducted to specifically examine the relationship between anxious-preoccupied attachment and impulse buying in college students. The main purpose of the current investigation is to test the hypothesis that anxious-preoccupied attachment style is linked to higher levels of impulse buying among college students, as well as the role of emotional regulation in the relationship between the two. The current investigation proposes that college students who exhibit higher levels of anxious-preoccupied attachment style also exhibit higher levels of impulse buying, and that emotional regulation may be a factor in the relationship. The research will utilize a quantitative research design in the form of a cross-sectional survey. The population of the research will comprise college students ranging in age from 18 to 23 years old, attending college in the United States. The research will utilize an online survey that measures attachment

style, emotional regulation, and impulsive buying behavior through the application of scales to the participants. This study contributes to the understanding of how emotional attachment patterns may influence consumer behavior and financial decision-making among college students.

#239 - Jackson, Cadence

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Leyla Rios de Alvarez, Department of Animal and Dairy Sciences
Co-Author(s): Larry Leon-Medina, Maggie Dillahunty, Baylee McAnally, Gabrielle Champ, Caroline Chapman
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Physiological Variables Associated with Heat Stress in Kiko and Spanish Goats Grazing in Summer Conditions in Mississippi

Mississippi is characterized by hot and humid weather during summer. To analyze the effect of weather on physiological variables associated with heat stress in grazing goats, a trial was conducted at the H.H. Leveck Research Center, Mississippi State University. Six Kiko (K) and six Spanish (S) goats were randomly selected from a group of 30 weaned males (initial weight 26 ± 1.2 kg and age 5 to 6 months old), grazing warm-season forages in a rotational system, and 1% body weight supplementation with a commercial concentrate (16% CP). Animals were restrained weekly for 10 weeks during summer (June to August), at the hottest time of the day (2 pm), to measure four variables: Respiration Rate (RR), Panting Score (PS), Heartbeat (HB) and Rectal Temperature (RT). Environmental temperature and humidity were recorded using a weather station to calculate the THI. Data were analyzed in SAS 9.4 using a mixed model with THI as a covariate and Animal as a random effect. RR was significantly affected by breed ($P < 0.001$), being lower in K (113.63 ± 3.99) than in S (128.15 ± 4.39). RT was higher in K (39.94 ± 0.07) than in S (39.63 ± 0.06). HB and PS were not significant, with averages of 125 ± 3.3 and 0.72 ± 0.06, respectively. The average THI during the experiment was 86.06, indicating that the animals were experiencing heat stress. THI proved to be a good predictor, especially for RR, as increases in THI corresponded to increases in RR=−157.78+3.23(THI) $R2=0.32$ ($P < 0.001$), meaning that for every unit of increment in THI, the respirations increase by 3.23. Further studies could help elucidate how these variables interact under grazing conditions, helping these breeds tolerate harsh conditions to maintain productivity.

#148 - Jackson, Meri

Major: Business Administration - Bachelor of Business Adm
Faculty Research Mentor: Mary Nelson Robertson, Biochemistry Nutrition Health Promo
Co-Author(s): Hunter Thompson, Hunter Thompson
Funding: None | **Project Category:** Social Sciences

Building Cross-Sector Understanding of Farm Stress Through the "On the Farm" Docuseries

Farmers face uncontrollable stressors every year, such as government restrictions, unstable markets, and intense climate factors. With no way to avoid these uncontrollable stressors, farmers are still called on day-to-day to feed and sustain the world. After facing such significant stress, farmers are 3.5 times more likely to die by suicide than the general population. "On the Farm" is an eight-part docuseries that highlights real-life farmers sharing their experiences with stress. This evaluation study of "On the Farm" focused on the differences in impact on those that work in the agriculture sector compared to those that do not. Of the 1,000 participants, more than half completed the evaluation (n=510). Most respondents identified as female (n=278;70.6%) and White (n=276;68.3%), with an average age of 37.08 years. Significant differences were found between those in the agriculture sector. Those that work in the agriculture sector ($M=4.15, SD=1.05$) reported that the film more accurately reflected their experiences than the non-agriculture sector ($M=3.65, SD=1.20$), $t(434)=4.09, p < .001$). Those that do not work in the agriculture sector ($M=1.99, SD=.96$) were more likely to report that they learned a new coping strategy than those in the agriculture sector ($M=1.68, SD=.92$), $t(434)=-3.13, p < .001$). In addition, the agriculture sector was more likely to talk about On the Farm with a family member, friend, co-worker, employee, or someone else. "On the Farm" appears to be a meaningful way to build shared understanding across both the agriculture sector and non-agriculture sector. The findings highlight the need for targeted mental health support for farmers and the value of narrative-based

approaches in capturing farm stress. By amplifying farmers' lived experiences, this work can open new pathways for support, reduce stigma, and increase awareness of rural community challenges.

#240 - Jarvais, Arabella

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Tim Boltz, Poultry Science
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Comparing a lab-scale pellet mill and lab-based water bath on the thermal inactivation of a surrogate organism in broiler feed

Broiler feed is commonly pelleted to improve animal performance, reduce ingredient segregation, and enhance feed hygiene. However, feed safety concerns have increased following the implementation of the Food Safety Modernization Act and the reduced reliance on antibiotic growth promoters. Laboratory-scale models are often used to simulate the thermal inactivation of bacteria; however, their ability to mimic the pelleting process is poorly understood. This study evaluated the effects of conditioning temperature and time on bacterial reduction using a laboratory water bath model, a laboratory-scale pellet mill, and assessed pellet durability. Data was analyzed using a generalized linear mixed model in SAS with method, temperature, and time as fixed effects. Pellet durability was analyzed without the method factor. Least-squares means were separated using Tukey's test ($P \leq 0.05$). In the water bath model, a temperature-by-time interaction was observed ($P < 0.05$), indicating that bacterial reduction depended on both conditioning temperature and time. Bacterial counts decreased with increasing time and were lower at 80°C than at 70°C, with the greatest reduction observed at 80°C for 30 s (2.93 log10 CFU/g). In the pellet mill, only time affected bacterial enumeration ($P < 0.05$), with bacterial counts decreasing from 5.88 log10 CFU/g in the control to 2.27 and 1.78 log10 CFU/g at 15 and 30 s, respectively. Pellet durability was not affected by conditioning temperature, time, or their interaction ($P > 0.05$). No temperature-by-time-by-method interaction was observed ($P > 0.05$). However, significant temperature-by-time, temperature-by-method, and time-by-method interactions were detected ($P < 0.05$), indicating that bacterial reductions differed across conditioning conditions and thermal inactivation methods. These results indicate that increasing conditioning temperature and time improve bacterial reduction during feed processing, although laboratory-scale models may not fully reflect the reductions achieved during pelleting.

#241 - Johnson, Taylor

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Federico Hoffmann, Biochemistry Nutrition Health Promo
Co-Author(s): Federico Hoffmann
Funding: None | **Project Category:** Biological and Life Sciences

Evolution of Relaxin Genes in Laurasiatherian Mammals

Relaxin is a peptide hormone involved in reproductive physiology, tissue remodeling, and cardiovascular regulation in mammals. Despite its biological importance, the evolutionary distribution of relaxin genes across mammalian lineages remains incompletely understood due to historical limitations on genome availability and gene annotation quality. The rapid expansion of high-quality mammalian genome assemblies now provides an opportunity to revisit the evolutionary history of these genes across diverse clades. In this study, we investigated the presence and distribution of the relaxin genes across Laurasiatherian mammals using comparative genomic approaches. Genome assemblies and gene annotations were obtained from public databases and analyzed using a custom bioinformatics pipeline to identify orthologs of relaxin genes across species. Gene presence and absence were compiled into a comparative matrix to evaluate patterns of conservation and apparent gene loss across lineages. Our analyses confirm that most variation in relaxin gene content across Laurasiatheria results from apparent gene losses rather than gene duplication. Interestingly, we identified relaxin gene sequences with intact coding regions in Himalayan antelopes despite the absence of detectable expression, supporting the hypothesis that regulatory changes may contribute to relaxin gene inactivation. We also detected traces of RLN sequences in genomes where the gene had previously been considered absent, including cattle, suggesting that remnants of the ancestral gene persist even after functional loss. Notably, these sequences show limited divergence despite apparent inactivation, suggesting that remnants of the ancestral

gene have been retained in the genome for extended evolutionary periods. These genomic traces provide an opportunity to infer the ancestral relaxin sequence prior to its inactivation and better understand the evolutionary processes shaping this hormone family. Together, this study provides a comparative genomic overview of relaxin gene evolution across Laurasiatherian and highlights the importance of newly available genome resources for resolving the evolutionary history of hormone signaling systems in mammals.

#149 - Jolivette, Christopher

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Allison Jaeger Berena, Psychology
Co-Author(s): Phuc Xuan Nhi Nguyen, Sepideh Jafarizaveh, Indira Nodal, Allison Jaeger
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Social Sciences

Doing right the wrong way: Integrating across representations supports learning from erroneous examples.
Mathematics proficiency is critical for success across many domains. Having sufficient math skill is especially important for success in Science, Technology, Engineering, and Mathematics (STEM) domains and careers (Uttal & Cohen, 2012). Unfortunately, many students find learning mathematics challenging and may even have math-specific anxiety that hinders their learning (Daker et al., 2021). One instructional tool that can support learning in math is worked examples, which demonstrate how to solve problems in a stepwise manner (Renkl, 2017). Further, erroneous examples research has shown benefits when students are given elaborative cues (Barbieri & Booth, 2016; Loibl & Leuders, 2019). The current study examined whether erroneous examples would improve student performance in geometry problem-solving and if erroneous examples impact this effect. Undergraduate students from the subject pool (N = 107) were randomly assigned to one of three between-subjects conditions; (1) Correct Examples condition which included both correct diagrams and correct procedures, (2) Incorrect Examples condition which included incorrect diagrams and incorrect procedures, and (3) Mixed Examples condition which included examples where either the diagram was correct and the procedure was incorrect or vice versa. Participants completed a pretest to assess their prior knowledge of basic mathematic concepts. During the learning task, participants saw 6 example geometry problems that included a diagram and math procedures and participants were asked to explain what the student did to reach their answer in each example. Participants in erroneous examples conditions viewed highlighted errors and were asked to explain why the highlighted portion was incorrect. Afterwards, participants completed a 19-item geometric word problem posttest. Results indicated that performance in the Incorrect condition was higher than performance in the Correct and Mixed Examples conditions, $F(2, 104) = 4.62$, $p = 0.012$. These results are consistent with prior research, emphasizing the role of elaboration in learning.

#036 - Jordan, Luke

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Vivek Khare, Aerospace Engineering
Co-Author(s): David Wallace, Jacob Walker, Joseph Nevels, Eli Coleman
Funding: None | **Project Category:** Engineering

Strategies and Technologies Aimed to Reduce the Electrostatic Effects of Lunar Regolith

The Artemis Program aims to institute a sustained human presence on the lunar surface, but several engineering challenges must be addressed before long-term establishment is achievable. One such challenge is lunar regolith, an abrasive and electrostatically charged dust that adheres to structures and equipment. Due to the absence of a magnetosphere, lunar regolith becomes charged through interactions with solar wind and ultraviolet radiation. These charged particles can contaminate and interfere with sensitive instruments, as well as accelerate erosive wear of mechanical components. To alleviate these effects, NASA has investigated several dust mitigation technologies, one of which is the electrodynamic dust shield (EDS). The EDS is an active system that generates propagating electric fields using three out-of-phase indium tin oxide electrodes. These fields repel and transport charged regolith particles away from protected surfaces. Simulations have demonstrated that EDS systems can efficiently remove regolith from

structural surfaces, indicating strong potential for protecting equipment and infrastructure during future lunar missions.

#242 - Jorden, Emma

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Caleb Lemley, Animal & Dairy Science
Co-Author(s): Kasey Elder, Kasey Elder, Marcus McGee
Funding: None | **Project Category:** Biological and Life Sciences

Maternal Melatonin Supplementation in Late-Gestational Cattle and its Effects on Calf Latency and Vigor Postpartum

Late gestation is a critical window for programming neonatal adaptation, and melatonin may influence neonatal readiness through circadian and neuroendocrine signaling. This study evaluated whether late-gestational maternal melatonin supplementation alters neonatal vigor and latency at birth. Late-gestating Angus cows were assigned to control (CON) or melatonin (MEL). Beginning at approximately day 209 of gestation, MEL cows received melatonin (200 µg/kg body weight) dissolved in ethanol and top-dressed onto feed; CON cows received an equivalent vehicle control. Treatments continued for 54 days and ended prior to calving. Dams were then monitored continuously (24/7 cameras) in a parturition pasture. Recordings were reviewed to quantify behavioral outcomes, including time to sternal recumbency, time to first standing attempt, time to stand, failed standing attempts, and vigor score (1–4) at 2, 5, 10, and 20 minutes postpartum. Latency variables were analyzed using Welch's t-tests; failed attempts and vigor scores were analyzed using Wilcoxon rank-sum tests. In this pilot (MEL-dam calves n=5; CON-dam calves n=4), no differences were detected for latency, failed attempts, or vigor ($P > 0.05$). Latency did not differ between calves from CON vs MEL-supplemented dams (sternal: 2.35 vs 2.56 min; first attempt: 14.88 vs 14.28 min; successful standing: 25.53 vs 19.98 min; all $P > 0.05$) Failed standing attempts were numerically lower and less variable in calves from MEL-supplemented dams (2–6) than calves from CON dams (1–15). Vigor scores did not differ ($P > 0.05$), but distributions varied numerically: at 2 min, CON-dam calves scored 3 more often (50% vs 20%), whereas at 20 min MEL-dam calves scored 4 more often (100% vs 75%); 5- and 10-min scores were similar. No treatment effects were detected for neonatal behavior at birth; however, numerical patterns in failed attempts, vigor, and time to stand support further research with additional calves.

#037 - Karki, Saugat

Major: Computer Engineering - Bachelor of Science
Faculty Research Mentor: Sungkwang Mun, CAVS Research
Co-Author(s): Nayeon Lee, Niranjan Giri, Justin Xie, Qing Liu
Funding: Shackouls Honors College Research Fellowship, Bagley Undergraduate Researcher Award | **Project Category:** Engineering

Impact-Induced Sound Analysis for Material Property Classification via Machine Learning

Industrial metal sorting, especially for mixed shredded non-ferrous aluminum-rich material (known as Zorba) and stainless steel-rich material (known as Zurik), still relies heavily on manual inspection, a process that is often time-consuming, prone to human error, and limited in scalability. To modernize this workflow, this research focuses on developing an automated classification system that integrates visual and acoustic features to distinguish between metallic and non-metallic materials as an initial step. My primary contribution focuses on developing the image-based detection and classification pipeline, utilizing the YOLO (You Only Look Once) framework to provide a robust visual foundation for material identification. Data collection involved capturing 60 images and video streams across three categories—sheet metal, wrought metal, and non-metal—using standard RGB cameras under drop test on a metal substrate. To ensure high accuracy, the training pipeline includes a rigorous data preparation phase where images are annotated using the computer vision annotation tool (CVAT) software and subjected to extensive data augmentation, such as rotation, perspective distortion, and color jitter, to improve model generalization across various recycling environments. After training YOLO models, the system generates bounding boxes and class confidence scores for these categories in both images and video streams. Preliminary results demonstrate the model's ability to detect and

identify metal and non-metal objects, while ongoing work focuses on hyperparameter tuning, including adjusting learning rates and batch sizes, to refine performance under complex conditions like material occlusion or varying camera angles. Ultimately, this integrated approach provides a fast, non-destructive, and cost-effective solution that enhances efficiency and reduces human error in industrial sorting applications.

#243 - Kava, Hunter

Major: Agricultural Science - Bachelor of Science
Faculty Research Mentor: Caleb Lemley, Animal & Dairy Science
Co-Author(s): Kasey Elder, Kasey Elder, Chayse Culbert, Christie Miller, Marcus McGee
Funding: None | **Project Category:** Biological and Life Sciences

Influence of Melatonin Supplementation on Behavior and Activity Patterns in Late-Gestation Beef Cows

Melatonin is a versatile hormone that helps regulate circadian rhythms and modulates stress-related endocrine pathways, potentially shifting daily activity patterns and reflecting changes in well-being. Our study aimed to assess the effects of third-trimester melatonin supplementation on activity patterns of Angus beef cows using direct observation. Pregnant Angus cows (n = 26) in the third trimester were randomly assigned to either a control group (CON) or melatonin group (MEL). Beginning at approximately day 209 of gestation, MEL cows received melatonin (200 µg/kg body weight) dissolved in ethanol and top-dressed onto supplemental feed, while CON cows received an equivalent amount of ethanol alone. Treatments continued for 54 days. Behavior was recorded on days 15, 29, and 55 during 12-hour observation periods using visual scan sampling. Behaviors were categorized as state behaviors (walking, standing, lying), location (sun, shade), and event behaviors (near hay, drinking, self-grooming, allogrooming). Inter-rater reliability among observers was evaluated using intraclass correlation coefficient (ICC). Event counts were analyzed using negative binomial mixed models and proportional time data were analyzed using beta-binomial mixed models. Melatonin supplementation altered select activity and location behaviors. On day 15, MEL cows were observed at the water more frequently than CON cows, but not thereafter (P=0.0005). On day 55, MEL cows walked less than CON cows (P = 0.02), with no differences detected on days 15 or 29. MEL cows spent more time in sun-exposed areas (P = 0.007) and were observed near hay more frequently than CON cows (P = 0.0002). No differences (P > 0.05) were detected for standing, lying, self-grooming, or allogrooming. These findings indicate that late-gestational melatonin supplementation influences dam daily activity, appearing to be time-dependent. However, further research is needed to determine the consistency of these responses and to understand the physiological mechanisms driving these behavioral changes.

#244 - Keeton-Reddix, Macy

Major: Poultry Science - Bachelor of Science
Faculty Research Mentor: Pratima Acharya Adhikari, Poultry Science
Co-Author(s): Craig Wyatt, Chris Magee
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Supplementation of standard and higher doses of phytase enzyme on alfalfa and wheat midds-based diets fed to post-peak laying hens

Phytase supplementation in poultry diets has been shown to improve nutrient absorption, including calcium, phosphorus, and amino acids. Alfalfa meal, a natural source of beta-carotene and xanthophylls, can be incorporated into layer diets to enhance yolk and skin pigmentation. However, the combined effects of higher phytase inclusion and alfalfa meal on pigmentation and metabolic responses in laying hens have not been evaluated. Therefore, this trial was conducted to investigate this interaction. A total of 120 Hy-Line 66-week-old hens were randomly allotted to cages (2 hens/cage) with 15 replicates per treatment. A 2 × 2 factorial design was used with two phytase levels and two fiber sources: TRT 1—corn–2% wheat middling (WM) with 400 FTU phytase; TRT 2—corn–2% alfalfa meal (AM) with 400 FTU; TRT 3—corn–WM with 2,000 FTU; and TRT 4—corn–AM with 2,000 FTU. Diets were fed as mash for 6 weeks. Feed intake and feed conversion were calculated at 3 and 6 weeks, and bird weights were recorded at the beginning and end of the trial. One egg per pen was collected at 0, 3, and 6 weeks for egg quality evaluation. Blood samples were analyzed for plasma inositol, and liver weights and fatty acid profiles were determined at the conclusion

of the study. Data were analyzed using PROC GLM, and means were separated using Fisher's protected LSD. Yolk color was greater (P<0.001) in TRT 2 (7.46) and TRT 4 (7.53). Inositol concentrations differed (P<0.0001), with TRT 3 highest (21.679). Fatty acid analysis indicated lower w-3 values in alfalfa diets, while w-6 did not differ. Results indicate alfalfa improves pigmentation and inositol, whereas elevated phytase did not further enhance responses.

#150 - Keith, Margaret

Major: Communication, Media & Theatre - Bachelor of Arts
Faculty Research Mentor: Holli Seitz, Communication
Co-Author(s): Andrew Cole
Funding: ORED Undergraduate Research Program
Project Category: Social Sciences

Evaluating the Effectiveness of *HappyHealthy* Social Media Posts Using Eye-Tracking and Survey Methods
Background and Objective: *HappyHealthy* is a social marketing campaign designed to increase fruit and vegetable consumption and promote physical activity. The objective of this research is to understand visual attention to and effectiveness of existing *HappyHealthy* social media posts. **Methods**: A representative sample of 295 adults in the United States participated in this two-part online survey-based study. In Part 1, participants viewed a total of nine *HappyHealthy* social media posts while eye behavior was tracked using RealEye online eye-tracking software. In Part 2, participants saw three randomly selected social media posts; answered questions about their intention to click the link, try the recipe or activity being promoted, and share the post; and responded to three measures of perceived effectiveness of the social media post. **Results**: The eye-tracking findings show that most of the visual attention was directed to the social media caption and the center of each image. The survey findings show that, overall, mean intentions to click the post link were moderate, mean intentions to try the recipe or activity in the post were also moderate, and intentions to share each post were generally lower. Perceived effectiveness scores on all three measures were all above the scale midpoint, indicating at least moderate perceived effectiveness.
Conclusions and Implications: These findings provide baseline data demonstrating that participants concentrate visual attention on the captions and centers of *HappyHealthy* campaign social media posts and that these posts are moderately effective in shaping intentions to engage with social media posts and try healthy recipes and physical activities. These results, particularly those related to eye-tracking, have implications for designing health messages for social media. In the next phase of research, we will make modifications designed to increase the effectiveness of the social media posts.

#038 - Kelley, Joshua

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Thainara Lima, Ag & Bio Engineering
Co-Author(s): Vitor Martins, Vitor Martins, Thainara Lima
Funding: USDA Agricultural Research Service(USDA-ARS) Award | **Project Category:** Engineering

Developing a Scalable Deep Learning Framework for a National Inventory of Agricultural Terraces Using High-Resolution Aerial Imagery
Agricultural terraces are a long-standing structural conservation practice in U.S. agriculture designed to reduce surface runoff, minimize soil erosion, and protect downstream water quality. Despite their proven effectiveness, no comprehensive, spatially explicit national inventory of terraces currently exists. As a result, most soil erosion and conservation planning models omit terrace information, limiting their predictive accuracy and decision-support capacity. This research develops an operational and scalable deep learning framework to map agricultural terraces across the U.S. Midwest, with an initial focus on Kansas, Iowa, and Nebraska. The approach integrates multi-source remote sensing data, combining a 1-m lidar-derived national digital elevation model hillshade with National Agriculture Imagery Program (NAIP) false-color imagery to capture both topographic structure and vegetation patterns associated with terrace systems. These inputs are used to train a semantic segmentation model based on the ResUNet architecture, which integrates residual connections within an encoder–decoder framework to enhance feature extraction and improve delineation of narrow, linear conservation structures. High-quality terrace reference

labels developed by Iowa State University are used to construct a robust training dataset consisting of approximately 25,000 spatially distributed samples. Vector terrace data are converted to aligned binary raster masks representing terrace presence (1) and absence (0) at the model input resolution. Model training is conducted over 50 epochs using a mini-batch size of 64 and a binary cross-entropy loss function, with data augmentation applied to improve generalization across varying terrain, land cover, and illumination conditions. Preliminary results demonstrate strong spatial coherence and promising detection performance across diverse agricultural landscapes. The resulting terrace probability and binary classification maps enable the development of regional-scale terrace distribution products that quantify the extent and spatial configuration of structural conservation systems. These outputs provide critical missing inputs for soil erosion modeling frameworks and support conservation planning by linking existing structural practices with climate gradients, soil properties, and environmental drivers. Ultimately, this work advances national-scale conservation assessment and informs targeted prioritization of future implementation efforts.

#245 - Kelly-Van Domelen, Payton

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Barbara Kaplan, Department of Comparative Biological Sciences
Co-Author(s): Arpita Deb, Paige Lawrence
Funding: NIH R15 ES027650 | **Project Category:** Biological and Life Sciences

The Role of Aryl Hydrocarbon Receptor (AHR) in Indole-3-carbinol (I3C)-Induced Suppression of Antibody-Triggered Signaling

Multiple Sclerosis (MS) is a neurodegenerative autoimmune disease for which there is no cure. Currently available therapies have variable efficacy, so novel treatments are needed. Chemicals that bind to the aryl hydrocarbon receptor (AHR) are immune-suppressive and can attenuate MS-like disease in mice. However, some of these chemicals are also toxic, so ligands that bind AHR but do not exhibit toxicity are needed. Previously, I3C, derived from cruciferous vegetables, suppressed antibody production from B cells in a mouse MS model. Thus, we wanted to determine if I3C would also suppress antibody-triggered signaling in innate cells through a mechanism involving AHR. We hypothesized that I3C would suppress antibody-triggered signaling and that effect would be lost in *Ahr*$^{-/-}$ mice or in the presence of an AHR antagonist. We obtained splenocytes from untreated female mice, treated them with I3C, then stimulated with a streptavidin-biotin IgG2b (SBIgG2b) immune complex to activate innate cells. I3C suppressed the cytokines IL-6 and TNF-α. Next, we used splenocytes derived from *Ahr*$^{-/-}$ mice and found that I3C-mediated suppression of TNF-α was AHR-dependent but IL-6 was not. To confirm these results, we initiated studies using an AHR antagonist, and initial studies show that I3C-mediated suppression of TNF-α was AHR-dependent. These studies have provided clarification on the effects of I3C, but additional studies are needed. The studies provide initial evidence that I3C is immune-suppressive, suggesting it might have efficacy in autoimmune diseases such as MS.

#100 - Kiesel, Jonathan

Major: Mathematics - Bachelor of Science
Faculty Research Mentor: Jon Woody, Mathematics & Statistics
Funding: None | **Project Category:** Business and Economics

Statistical Limitations on Estimating the Kelly Criterion in Stock Portfolios

The Kelly Criterion, originally a formula used for gambling, has a rich history as a risk-neutral allocation method for stock investment portfolios. Currently, there are approximations and closed-form solutions for the unrestricted problem under certain model assumptions for a stock market, but no closed-form solutions for any generic model or for any restricted case of the problem are found. We examine the restricted case of non-leveraged portfolios, whose weights allocated into each stock are nonnegative, and we aim to find the optimal weights via an estimation approach. Under some practical assumptions i) where the returns are bounded almost surely and ii) the objective function we optimize is strongly convex, we found the estimator for these weights to be consistent and have a convergence rate without a curse of dimensionality with increasing the number of stocks. However, a numerical

simulation to test this method instead reveals there is no convergence of the estimator to the optimal weights, no matter how many more sampled points are drawn. This statistical limitation is known as "The Blur of History," a key finding in Quantitative Finance. For our current findings, there is reason to reject assumption ii) and look for alternative methods or other limitations to solving the Kelly Criterion.

#039 - Kingdom, Christian

Major: Information Tech Services - Bachelor of Science
Faculty Research Mentor: Jonathan Barlow, Data Science
Funding: None | **Project Category:** Engineering

Finance Dashboard

Personal financial transactions are everyday records of spending and income that, when organized effectively, can provide valuable insight into individual financial behavior. This project explores the design and development of an interactive dashboard that collects, processes, and displays all personal spending transactions in a clear and meaningful way. The system integrates transaction data from bank statements or manual inputs and automatically categorizes expenses into groups such as rent, utilities, groceries, transportation, and income. During development, realistic financial datasets are imported into the dashboard, and the system's performance is evaluated by measuring accuracy of categorization, speed of data processing, and clarity of visual output through charts and summaries. Additional features will include filtering by date range, generating monthly spending comparisons, and identifying trends in spending habits over time. These features test the hypothesis that individuals will make more informed financial decisions when their spending patterns are presented in an organized and visually accessible format. Research and development of personal financial dashboards contribute to improved financial awareness and budgeting skills. This project is relevant for students and working professionals alike, as a better understanding of spending behavior can lead to stronger budgeting practices, reduced unnecessary expenses, and improved long-term financial stability.

#151 - Knight, Leonard

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Mary Dozier, Psychology
Funding: None | **Project Category:** Social Sciences

Home-based motivational interviewing for late life rural hoarding disorder: Feasibility and Acceptability

Motivational interviewing aims to reduce hoarding in older adults by directly focusing on motivation for behavioral change. In previous trials, it has been shown that cognitive behavioral therapy (CBT) is effective for hoarding disorder; however, it may be less effective for older adults. The aim of this study was to investigate the feasibility of a 16-week in home behavioral intervention for late life hoarding that incorporates intensive motivational interviewing (Reduce Clutter and Increase Meaning; RECLAIM) compared to a 16-week behavioral control (in home "sorting practice"; SP). Participants (N=48) received 16 weekly 1 hour treatment sessions for RECLAIM or SP in their homes. Participants rated acceptability of the intervention at the end of session one and 25% of sessions tapes were blindly reviewed for adherence and competency. Both conditions were rated similarly acceptability the end of session one with 76% of SP participants and 79% of RECLAIM participants indicating favorable ratings of acceptability. Audio was available for review from 285 sessions across 22 different participants); 69 sessions were blindly reviewed for adherence, general competency, and MI competency by a licensed clinical psychologist. Both conditions were rated highly for general adherence (SP: $M = 7.85$, $SD = .46$; RECLAIM: $M = 7.53$, $SD = .21$; $t(67) = -1.31$, $p > .05$). All sessions in the SP condition were rated as 8/8 for general competency; however, five of the sessions in the RECLAIM condition were rated as 6/8 for general competency (SP: $M = 8.00$, $SD = 0$; RECLAIM: $M = 7.77$, $SD = .10$; $t(67) = 1.82$, $p = .04$). There was a significant difference between the two conditions for ratings of MI competency (SP: $M = 2.42$, $SD = .15$; RECLAIM: $M = 4.84$, $SD = .29$; $t(67) = -6.09$, $p < .0001$). Rural-dwelling older adults with hoarding disorder found a novel in-home treatment to be generally acceptable. Graduate student clinicians were able to deliver the intervention with high adherence and competency. Additional research is needed to understand barriers to training of in-home mental health workers to deliver the intervention.

#246 - Koger, Emma Grace

Major: Ag Eng Tech & Bus - Bachelor of Science
Faculty Research Mentor: Brandi Karisch, Animal & Dairy Science
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

AI-Based Fly Detection in Cattle Using Video Surveillance for Improved Farm Efficiency and Animal Welfare
Flies can cause stress, increase disease transmission, and lead to weight loss in cattle. While fly monitoring methods like bait traps and manual counting work, they are labor-intensive and inefficient. The objective of this study was to develop an AI-based model to detect flies on cattle to improve health management and increase production in herds. Images of cattle were collected of various breed types, color, and sex, at different lighting, angles, and distances, utilizing a standard cell phone camera (iPhone 14). A real-time object detection AI algorithm, YOLOv8, was trained to detect flies on cattle in uploaded images. Training included drawing boxes around individual and group flies. From this, the model was trained to detect flies solely on the body. Once all the images were labeled, a prompt was created to run the model in AnacondaNavigator to test precision, recall, and mean average precision. The model was run at 250 epochs with an 80–20% train-validation rate. Each test included 100 frames with anywhere from 25 to 150 flies on the cattle. Ultimately, the model was run four times, cycling each image at set intervals, and concluded with positive and negative feedback. The YOLO model is learning, but detection performance is weak, with mAP@0.5 ≈ 0.121 and a maximum recall of around 0.23. Performance improved on high-quality, close-range images but declined with lower-resolution or distant imagery. Despite these limitations, this AI-driven fly detection system demonstrates potential as a tool for automated livestock monitoring, and with improved imaging quality and dataset expansion, may contribute to reduced labor demands and improved cattle health and welfare.

#247 - Laird, Riley

Major: Microbiology - Bachelor of Science
Faculty Research Mentor: Beth Peterman, CVM Pathobiology/Population Med Dep
Co-Author(s): Jill Hudnall, Jill Hudnall, Beth Peterman
Funding: BRIDGES Scholar | **Project Category:** Biological and Life Sciences

Preservation to Conservation: workflow of marine mammal necropsy and tissue preservation
The Atlantic bottlenose dolphin (Tursiops truncatus) is commonly found in the coastal waters of Mississippi within the Mississippi Sound. These apex predators, commonly seen in aquariums, are essential bioindicators that provide much information about the health of the water they inhabit. The Gulf Coast Aquatic Health Lab at Mississippi State University, in partnership with the Institute for Marine Mammal Studies (IMMS), investigates when these dolphins, and other marine mammals, wash ashore on the Gulf Coast. When a dolphin is found, several steps follow to determine cause of death. The first step after a stranding is to perform a necropsy, a process in which all parts of the dolphin's body are examined for abnormalities. The Gulf Coast Aquatic Health Lab has been partnering with IMMS since 2018. Evaluation of the histopathological tissue allows for identification of any bacterial, viral, fungal, and/or parasitical factors that may have led to the death of the animal. Once necropsy is completed, histopathological tissue is sectioned to be mounted on microscope slides to for further examination by a veterinary pathologist. Fresh tissue is also screened for parasites by a parasitologist. Necropsy samples are collected and archived for future research regarding microplastics, DNA sequencing, toxicology, and diet analysis. This represents only a small portion of the process that follows the collection of a stranded marine mammal. By examining every aspect of a stranded dolphin, essential information can be gathered about the health of the species in the waters of the Mississippi Sound.

#152 - Lambert, Joanna Grace

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Allison Jaeger Berena, Psychology

Co-Author(s): Sepideh Jafarizaveh, Olivia Sanders, Sepideh Jafarizaveh, Allison Jaeger
Funding: ORED Undergraduate Research Program | **Project Category:** Social Sciences

The Effect of AI Generated Explanations on Students Judgments of Learning
Since the development of Generative AI there has been interest in examining and understanding the educational value of AI generated content. Generative AI has begun to change the way students complete their academic assignments and may also impact how they apply critical thinking skills and perceive information (Jo, 2024). In this study, we examined how participants' judgments of science explanations differ as a function of who they think generated the content (Explanation Source). A sample of 216 undergraduates first read a science text about cellular division and then gave a judgment of learning (JOL 1). After reading the base text, participants read an explanation of the main ideas that was presented as being generated by ChatGPT, a peer student, or a TA, then made another judgment of learning (JOL 2). After reading the explanation, participants were given a copy of the explanation on paper and told to make edits and revisions to make a stronger version and then were prompted to make another judgment of learning (JOL 3). Finally, participants completed a posttest. While results indicated no effect of Explanation Source on posttest score, there was an effect on JOLs. While all participants' judgments increased from JOL 1 to JOL 2, only participants who believed the explanation was written by ChatGPT showed a judgment increase from JOL 2 to JOL 3, after making edits to it. These results indicate that while participants in all explanation conditions gave similar JOLs at the beginning, engaging with explanations they thought were written by humans versus AI changed their judgments. This suggests that students may be more willing to trust or learn from content they believe comes from a human expert (e.g., their TA) but may also benefit from critically engaging with or evaluating AI generated content.

#040 - Lawson, Anabelle
Major: Industrial Engineering - Bachelor of Science
Faculty Research Mentor: Jessica Gonzalez Vargas, Industrial and Systems Engineering
Funding: ORED Undergraduate Research Program | **Project Category:** Engineering

Do You Trust AI? Exploring Perceptions, Knowledge, and Training Strategies in Healthcare
Artificial intelligence (AI) is increasingly being integrated into healthcare and has the potential to significantly improve clinical efficiency, decision-making, and patient outcomes. Its applications span a wide range of tasks, including automated documentation, patient scheduling, interpretation of medical scans and reports, telehealth delivery, and workflow optimization. Despite these benefits, adoption of AI among physicians, nurses, and other healthcare professionals remains limited due to a lack of understanding, trust, and confidence in its use. Few studies have systematically examined the barriers to AI acceptance in healthcare or explored strategies to improve its integration into clinical practice. This two-part study is designed to address these gaps by identifying key limitations to AI adoption and testing educational strategies to improve acceptance. The first part involves a comprehensive survey of healthcare professionals to assess attitudes toward AI, perceptions of its usefulness in clinical settings, and the current applications of AI in their workplaces. The survey also examines factors influencing trust, willingness to adopt AI, and perceived barriers to implementation. The second part consists of a general AI-focused online training program, designed to teach AI fundamentals and usage. This training was tested with college students and evaluated using pre- and post-surveys to assess changes in knowledge, confidence, and perceptions of AI. The goal is to examine whether structured training can improve understanding and acceptance of AI, with implications for translating these strategies to healthcare providers. By integrating findings from both parts, this study aims to provide actionable insights into strategies that enhance AI literacy, build trust, and support its responsible adoption in healthcare environments. The results are expected to inform the design of educational interventions and training programs that empower healthcare professionals to effectively leverage AI technologies, ultimately improving workflow efficiency, patient care, and clinical decision-making.

#153 - Lee, Devyn
Major: Fashion Design & Merchandising - Bachelor of Science
Faculty Research Mentor: JuYoung Lee, School of Human Sciences

Co-Author(s): Minel Guler
Funding: None | **Project Category:** Social Sciences

Id, Ego, and Superego in Fashion Consumption: Exploring Psychological Conflict in Retail Purchase Decision-Making

Consumer purchasing behavior is influenced by a number of sociological components, such as impulses, morals, and the evaluation of desire versus emotion. While there is prior research on impulse buying and buyer's remorse, few studies have examined these behaviors through the lens of a psychoanalytic framework. Sigmund Freud's structural model of personality, which consists of the id, superego, and ego, provides an understanding of how internal psychological forces influence consumer behaviors. The id represents the instinctual desires for gratification, the superego reflects the moral standards, and the ego mediates between these two forces through evaluation. Understanding how these internal psychoanalytic processes influence impulse buying and buyer's remorse is important, particularly amongst young adults who are experiencing financial independence and creating new consumption habits. The objective of this study is to examine how the id-driven tendencies, the superego morality, and the ego mediation influence the impulse buying behaviors and consequential buyer's remorse among young adult consumers. Specifically, this study proposes four hypotheses: (H1) Stronger id-driven tendencies will be positively associated with impulse buying behavior, (H2) Impulse buying behavior will be positively related to buyer's remorse, (H3) Stronger superego tendencies will be negatively associated with buyer's remorse, (H4) Ego regulation will mediate the relationship between id-driven impulses and purchasing outcomes. To test these hypotheses, this study will use a quantitative survey targeting individuals aged 18 to 25. Data will be collected through an online questionnaire distributed via voluntary participation. The survey will measure impulse buying tendencies using established impulse buying scales and assess buyer's remorse through measures of post-purchase guilt and regret. All constructs will be measured using Likert-type response scales. This research contributes to consumer behavior literature by integrating psychoanalytic theory with purchasing decision-making, offering insight into how psychological dynamics influence impulse buying and post-purchase emotional responses among young adult consumers.

#118 - Lee, Madeline

Major: Liberal Arts - Bachelor of Arts
Faculty Research Mentor: Gil Carter, Communication
Funding: None | **Project Category:** Humanities

The World Priest of the Cold War: Ronald Reagan's Anti-Soviet Rhetoric of Definition

On March 8, 1983, Ronald Reagan addressed the National Association of Evangelicals, calling the Soviet Union an "evil empire." Reagan used his presidential rhetorical power of definition (Zarefsky, 2004) to characterize the Soviets as "the focus of evil in the modern world." Campbell and Jamieson (2008) state that the president can be a type of national priest, as presidents often use their rhetoric to draw the nation closer to moral and religious ideals. In this work, I expand Campbell and Jamieson's national priest function by arguing that, in his "Evil Empire" speech, Reagan submits himself as a priest not merely for the U.S., but for the world. As world priest, Reagan asserted himself as arbiter of free and unfree, right and wrong, and capitalism and communism. This analysis provides a further example of how presidents rhetorically define political landscapes and cultural realities through intentional rhetorical acts. By understanding Reagan's role as a priest of the world, we can understand more about the American presidency, Reagan's influence on his fellow world leaders, and Reagan's other Cold War rhetoric.

#108 - Lee, O'Brien

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Holli Seitz, Communication

Co-Author(s): Natalie Staggers
Funding: ORED Undergraduate Research Program | **Project Category:** Education

Teaching Communication in the Science Classroom: Thematic Analysis of Student Reflections on Learning
Scientists are increasingly called upon to communicate science to nontechnical audiences, but science curricula offer limited opportunities to build communication skills. Incorporating communication training into an existing science course provides opportunities for students to develop and practice communication skills in the context of their discipline. The objective of this research was to identify themes in written student reflections from a science course that incorporated a communication training element. In Fall 2022 and Fall 2023, written reflection essays were collected from students (Fall 2022 N = 11; Fall 2023 N = 5) in a biology course covering science design and science communication. Students in the course received eight sessions on science communication within the context of the larger course and completed three communication assignments (analysis of a science communication product, audience analysis, and development of a science communication product). At the end of the course, they completed a reflection essay of approximately 1,000 words in which they were asked to reflect on work they completed in the course and describe what they did, what they learned in each assignment, and how they would use this knowledge in the future. Reflections were analyzed to identify themes using Braun and Clarke's 2006 thematic analysis methodology and QDAMiner Lite software. Prevalent themes and examples will be presented. These themes will be useful for understanding the main takeaways science students gain from taking a class with a communication training element. The results of the project will serve to aid the improvement of science communication by helping educators work to refine their communication training efforts.

#154 - Lentz, Matthew

Major: Geoscience - Bachelor of Science
Faculty Research Mentor: Michelle Saunders, Geosciences
Co-Author(s): Boniface Fosu
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Social Sciences

Severe Weather Risk Perceptions of International Students at Mississippi State University
From tornadoes to ice storms, people living in the United States must be prepared for all sorts of extreme weather. While many Americans are familiar with these hazards, people outside the U.S. may not be as aware. Over the past several decades, the U.S. international population has grown significantly, with the international student population reaching numbers of over one million. This study explores perceptions of severe weather risk among international students at Mississippi State University. The goals of this study were to determine how international students would respond to tornado watches versus warnings, how cultural backgrounds and prior experiences influence risk perception, and how access to transportation or shelters affects their ability to respond. To help answer these questions, an online Qualtrics survey was disseminated to International Students at MSU. Data were analyzed using Python and SPSS, with Python as the primary tool for visualizations (graphs and plots) and SPSS for statistical testing. Thanks to nearly 170 international students who completed the survey in its entirety, the results revealed several key findings. Specifically, less than half of the participants indicated that they would seek shelter immediately if they received a "Tornado Warning" alert on their phone. Participants were also not as familiar with winter weather hazards, as only 38% correctly selected that ice storm warnings involve mostly freezing rain and some sleet. In addition, international students' use of weather apps and websites increased, pivoting away from television and radio weather sources after arriving in the United States.

#041 - Levy, Emme

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: David Van Den Heever, Ag & Bio Engineering

Co-Author(s): Zack Murphy, Peyton Fox
Funding: None | **Project Category:** Engineering

Using FPVS and EEG to Identify Neural Differences in Dyslexia
Dyslexia is a specific learning disability that affects the brain regions that affect reading and language processing centers in the brain. People with dyslexia struggle with phonological processing, linking sounds to written letters, and visual word recognition. Dyslexia is diagnosed through a combination of tests that evaluate reading skills, language processing, and cognitive patterns. This study aims to investigate how the responses of individuals with dyslexia differ from those of non-dyslexic individuals to the stimulus. We use fast-paced visual stimulus (FPVS) paired with an electroencephalogram (EEG) to measure whether there is a high signal-to-noise ratio (SNR) at the given oddballs in the different stimuli. Participants who show a high SNR value at the oddball demonstrate that their brain responded to the oddball, while participants who do not show a strong SNR value indicate that their brain did not register the oddball in the stimulation. We predicted that individuals with dyslexia would show a lower SNR value compared to those without dyslexia. So far we have been able to detect strong responses in four out of six of our conditions. With this study, we hope to find distractive differences that may help identify ways to diagnose dyslexia using FPVS and EEG.

#248 - Lewis, Mallory

Major: Agronomy - Bachelor of Science
Faculty Research Mentor: Jesse Morrison, Plant and Soil Sciences
Co-Author(s): Hunter Pegram
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evaluating Cold Tolerance in non-GMO Winter Canola Varieties for Increased Resilience in Central Mississippi
In recent years, the Deep South has seen a rise in production of winter canola (*Brassica napus L.)* as both a cover crop and cash crop, generally following soybeans. While there is significant interest from the agricultural industry in production of winter canola in Mississippi, regionally-specific management recommendations are generally lacking. Cold tolerance – or winterhardiness – is one of the primary factors to consider before choosing a canola variety, as planting date is relative to the first hard freeze (≤20°F). Generally, canola plants require six weeks of hardening off before they are expected to survive exposure to a hard freeze. Overwhelmingly, cold tolerance research has been conducted from the American Midwest through central Canada, and often in the spring. In Mississippi, canola fits well as a rotational crop following soybean, and as such, establishment is inherently delayed until after soybean harvest (September-October). This timing often puts the six-week hardening process in jeopardy, risking winterkill and, potentially, complete stand loss. To evaluate elite germplasm for winterhardiness, 12 cultivars (9 conventional, open pollinated; 3 hybrid, open pollinated) were selected from the National Winter Canola Variety Trial (Kansas State University, Manhattan, KS USA) and established at the H.H. Leveck Animal Science Research Farm in Starkville, MS. The study design was a randomized complete block design with planting dates every two weeks from September 1 until the first hard freeze. Each cultivar was represented with three replications per planting date. Plots were established from seed using single, 15′ long rows, with a target plant density of 1.5 plants per square foot.

#249 - Lile, Spencer

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Christopher Johnson, Chemistry
Co-Author(s): Emily Campbell, Dr. Steven Gwaltney
Funding: None | **Project Category:** Biological and Life Sciences

ENHANCED STRUCTURAL PREDICTIONS OF VOLTAGE GATED CALCIUM CHANNELS
Voltage gated calcium ion channels (Ca_V) are an integral component in excitation contraction coupling. During the past decade, advancements in CryoEM have afforded significant insight into transmembrane regions of the channel. Additionally, many of the cytosolic components have been biophysically and structurally characterized. Here, we have calculated all-atom models of the complete sequence of several Ca_V channels in a lipid bilayer with explicit salt and

water. Four one-microsecond molecular dynamics (MD) simulations improved backbone torsion angles for non-transmembrane residues relative to the current AlphaFold model. The time component of our MD simulations provided unique insight into side chain dynamics, solvation, voltage sensors, and features of the channel pore. Comparing our post-MD model with empirical data obtained in the presence of small molecules provided mechanistic insights into several small molecule interactions. Cytosolic components that were absent in CryoEM data were predicted to occupy a tertiary structural arrangement. Intriguingly, several of these features are established sites for calmodulin interaction.

#155 - Littlejohn, Manning

Major: Data Science - Bachelor of Science
Faculty Research Mentor: Jonathan Barlow, Data Science
Co-Author(s): Kallen Zhou, Isabella Garrard
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Social Sciences

The Moral Cost of Agreement: A Quantitative Benchmark of Sycophancy in Large Language Models' Moral Reasoning

Large language models (LLMs) are increasingly being utilized in high-stakes domains such as healthcare, defense, and education. However, these models exhibit "sycophancy," the tendency to generate biased outputs that align with a user's desires. As LLMs increasingly participate in decision-making that affects lives, understanding how they align with user biases has become critical to ensuring ethical artificial intelligence (AI) behavior. Current literature has quantified sycophancy in objective areas such as mathematics and healthcare, but there is a lack of research analyzing this phenomenon in subjective moral decision-making. This study seeks to establish a quantitative benchmark for measuring sycophancy across varying levels of user bias. Moral scenarios across different ethical domains are generated using a human-in-the-loop workflow with reliability assessed using Fleiss' Kappa. Using a bipolar Likert scale (-5 to +5), we quantify the magnitude of moral sycophancy in Gemini and GPT models by analyzing the difference in moral ratings between neutral baselines and user-biased prompts. Using a paired sample t-test approach on the difference scores, we identify which models and scenarios are most susceptible to shifts in moral judgment toward user bias. These results are reported with statistical confidence intervals (95%) and visualized using Box-and-Whisker plots to display the distribution and skew of model responses. We expect a consistent vulnerability in current models to prioritize user validation over ethical consistency. By illustrating sycophancy across ethical domains, this study reveals where current AI parameters fail and proposes a framework for benchmarking moral consistency in LLMs. This is critical for policymakers and developers in creating standardized safety benchmarks that evaluate moral consistency.

#042 - Lovell, Emma

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Dong Chen, Ag & Bio Engineering
Co-Author(s): Bishal Adhikari, Jessica Drewry, Leticia Orellana Galindo, Kenneth Macklin
Funding: ORED Undergraduate Research Program | **Project Category:** Engineering

Classifying Eggshell Translucency Using Machine Learning Techniques

Egg translucency is a shell characteristic and is a good predictor for the hatchability of an egg. Currently, translucency grading must be done by visual inspection. This process is very time consuming and difficult to standardize across large-scale production systems. This study investigates an automated, image based approach for classifying eggshell translucency using machine learning techniques. A labeled data set of different eggs with their translucency score was collected and preprocessed through resizing, normalization, and augmentation. A convolutional neural network was trained to classify different levels of translucency. Results indicate that the proposed model can effectively distinguish translucency categories and demonstrates the potential reduced reliance of translucency grading by hand. As of right now, the model is able to predict an eggs translucency score with 85 percent accuracy, but work is being done to improve this percentage. This automated approach offers a scalable and consistent solution for improving quality control in commercial egg production.

#250 - Lovell, Natalie

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Shankar Ganapathi Shanmugam, Institute for Genomics, Biocom, Biotech
Co-Author(s): Jasmine Sahota, Mentor X
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Cover Crop Species Composition Shapes Rhizosphere Microbial Communities and Soil Carbon Dynamics

Corn, one of Mississippi's most significant agricultural exports, requires substantial nitrogen inputs to achieve optimal yields. To mitigate the economic and environmental costs associated with synthetic fertilization, many farmers implement cover cropping strategies prior to the main growing season. Cover crops are selected for their ability to form symbiotic relationships with nitrogen-fixing bacteria, prevent soil erosion, and sequester carbon in the soil. This study investigates how different monocultures and polycultures of brassica, grass, and legume cover crops influence soil nitrogen and carbon availability under controlled greenhouse conditions. The objectives are to (1) Evaluate the impact of cover crop diversity on soil microbial activity and nutrient cycling, and (2) Characterize rhizosphere bacterial communities associated with carbon mineralization via metabolic characterization. Monocultures of Winter Wheat (grass), Gulf annual rye (grass), Crimson clover (legume), and purple top turnip (brassica), along with two- and three-way polyculture mixtures, were planted alongside four fallow controls, with four replicates per treatment in approximately 10 lb of soil sourced from north Mississippi farming fields. Once a week, heights of the tallest plant of each species were recorded and the pots' positions rotated. After termination, rhizosphere soil samples will be collected from each pot and metabolic characterization will be done using BIOLOG ecoplates to quantify microbial functional diversity. We hypothesize that legume monocultures and polycultures will contribute the greatest levels of bioavailable carbon and nitrogen to the soil. Findings from this study will provide critical insights into optimizing cover crop selection for sustainable nutrient management and soil health enhancement in Mississippi agroecosystems.

#156 - Luquet, Shelby

Major: Communication - Bachelor of Arts
Faculty Research Mentor: Zahed Arman, Communication **Co-Author(s):** Molly Burch, Lindy Short
Funding: None | **Project Category:** Social Sciences

Understanding Local Business Willingness to Hire PR and Advertising Agencies: Communication Needs, Perceptions, and Barriers in a College-Town Market

This study examines the communication needs, marketing practices, and decision-making factors that influence Starkville business decision-makers' willingness to hire a public relations and advertising agency. As Golden PR & Advertising Agency prepares for its launch, understanding which services local businesses value, what barriers exist, and how businesses approach marketing is essential for developing an effective strategy within a college-town market. Data were collected from business owners, managers, and marketing decision-makers in Starkville, Mississippi through a survey distributed using a non-probability convenience sampling method. This approach ensured that responses reflected the perspectives of individuals directly involved in marketing and communication decisions. A quantitative research design was used, with survey responses measured using five-point Likert scales. Descriptive statistics were used to identify overall trends, while correlation analysis was used to explore relationships between demographic characteristics and marketing perceptions. The findings suggest that willingness to hire a PR or advertising agency is not strongly influenced by demographic factors such as age, business size, or years in operation. Instead, businesses vary more in their perceptions of marketing effectiveness and their openness to outsourcing communication efforts. Additionally, results indicate that lack of clear information about agency services and concerns related to trust are among the most prominent perceived barriers. These findings provide important implications for Golden PR & Advertising Agency, emphasizing the need to clearly communicate services, demonstrate value, and build trust with potential clients. By addressing these factors, the agency can better position itself to meet the needs of local businesses and establish strong client relationships within the Starkville market.

#251 - Luttrell, Colleen

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Jacob Dykes, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Eric Michel, Jacob Dykes, Eric Michel, Luke Resop
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Comparing Synthetic vs. Biofertilizers for Soil Nutrients, Forage Quality, and Forage Production in Wildlife Food Plots

Wildlife food plots are commonly used to increase wildlife viewing opportunities and provide supplemental nutrition. Soil health is one of the most important considerations in wildlife food plots, and synthetic fertilizers are the most popular approach to soil amendment. Concerns about sustainable land management practices have increased interest in biofertilizers as an alternative. However, it is not well understood how biofertilizers compare to synthetic fertilizers. We designed a study to compare the effects of synthetic fertilizers and biofertilizers on soil nutrients, forage quality, and forage production across warm- and cool- season wildlife food plots on Mississippi State University's South Farm and in the greenhouse. The greenhouse provided an opportunity to evaluate plant nutrient composition independent of environmental variability and browsing. During the appropriate season, we planted warm- or cool-season legumes and non-leguminous forages in separate food plots and greenhouse pots and randomly assigned 1 of 3 treatments: 1) synthetic fertilizer, 2) biofertilizer, or 3) no fertilizer (control) based on soil test recommendations. We collected forage and soil samples periodically throughout the growing season to monitor and analyze nutrient composition. We also collected biomass estimates from within enclosure cages to estimate forage production. We are currently analyzing the data to evaluate differences in soil nutrients, forage quality, and forage production across treatments. Our results will inform wildlife managers about the effectiveness and sustainability of synthetic fertilizers and biofertilizers in wildlife food plots.

#157 - Lyons, Mari Alis

Major: Human Development & Family Sci - Bachelor of Science
Faculty Research Mentor: JuYoung Lee, School of Human Sciences
Co-Author(s): Minel Guler, Riley Howell, Jackson Gibson, Jakailyn Brown
Funding: None | **Project Category:** Social Sciences

Parental Buying Behavior: Sustainability, Durability, and Affordability of Children's Clothing in Single-Child and Multi-Child Households

Consumers are becoming increasingly aware of the environmental consequences attributed to the fast fashion industry. However, with children's rapid growth, especially in early childhood, parents are often forced to replace garments frequently, making reducing textile waste especially difficult while also increasing costs for households. Especially in the context of families with multiple children, factors such as quality and affordability may become more important as their resources are limited compared to a household with fewer children. In the context of the recent fashion industry, sustainability has become increasingly important for consumers as many consumers value sustainability more than before. However, there have not been many studies of parent's buying behavior for their children, or childrenswear sustainability. Therefore, this study will explore sustainability, quality, and affordability with regard to parents' purchasing decisions for children's clothing and compare those decisions between families with a single child and those with multiple children. It is predicted that parents' with multiple children will tend to prioritize quality and affordability, while parents with one child will prioritize sustainability and quality over affordability. A survey of parents of children under the age of seven is being conducted, which will use quantitative strategies to analyze data and determine which clothing variables are most important to different families. Sustainability, quality, and affordability and purchase intention will be measured using the existing scales. The findings of this project will provide new insight into how family size influences the way parents balance economic constraints with long-term wellbeing in the context of sustainability and may be useful in helping children's clothing brands tailor their marketing and production practices to align with the values of their target customers.

#101 - Manayakar, Sreesh

Major: Economics - A&S - Bachelor of Arts
University: I am a high schooler enrolled at Panther Creek High School
Faculty Research Mentor: Shaun Joynt, AP Macroeconomics Teacher
Funding: None | **Project Category:** Business and Economics

The Long-Run Impact of AI-Induced Productivity Shocks on Labor Market Equilibrium and Wage Polarization.
This paper examines how Artificial Intelligence (AI)–driven productivity shocks have affected wage inequality and labor market equilibrium in the United States between 2010 and 2024. Using a 15-year national panel that combines Occupational Employment and Wage Statistics from the Bureau of Labor Statistics with composite AI adoption indices derived from OECD and Stanford sources, the study documents a very strong positive association between AI intensity and wage polarization. Over the sample period, the 90/10 wage gap increases from 3.5 to 4.6 while the AI Adoption Index rises from approximately 0.05 to 0.65, with correlation and regression estimates indicating that movements in AI adoption explain nearly all of the variation in the wage gap. A decomposition by occupational skill group shows that high-skill wages grow by about 18.4 percent, low-skill wages by roughly 10.1 percent, and middle-skill wages decline by 2.3 percent, yielding a clear "hollowing out" pattern consistent with task-based models in which AI substitutes for routine cognitive tasks and complements abstract, problem-solving work. Robustness checks using alternative AI measures, detrended series, and lagged specifications confirm the stability of the relationship. Although the analysis cannot fully distinguish the role of AI from other factors affecting inequality, the evidence presented confirms that the adoption of AI technology has emerged as the driving factor in redefining the U.S. wage structure. It highlights the need to ensure the creation of tasks through appropriate policy support in order to maintain the current equilibrium in the labor market.

#043 - Mandal, Brijes

Major: Computer Engineering - Bachelor of Science
Faculty Research Mentor: Brady Swann, Raspet
Co-Author(s): Matthew Berk
Funding: B.R.I.D.G.E.S | **Project Category:** Engineering

Developing Web Software for Autonomous Aircraft Live View
Mission monitoring tools are often required by Flight Test Conductors to understand the performance of autonomous soaring algorithms in Uncrewed Aerial Systems. In many instances, test conductors may want to get real time aircraft data and utilize remote controls in such systems to send real time commands to monitor aircraft's behaviors. This project introduces a secure React.js-based web interface integrated with ROS2 packages such as rosbridge and roslib that allows researchers to monitor mission status and receive real-time updates from ROS2 nodes through a graphical user interface. Rosbridge provides a WebSocket interface that allows the browser to subscribe to and publish on ROS2 topics without requiring a native ROS installation, enabling web applications to communicate directly with ROS2 systems. The roslib library allows the React interface to easily interact with ROS2 topics, services, and messages from within the browser. Data flows from ROS2 nodes through rosbridge to the web interface, forming a pipeline where telemetry, system statistics, and mission events are continuously streamed, processed, and displayed in real time. This project allows researchers to communicate with the aircraft in real time with very low latency while using ROS2 nodes to exchange mission data. Overall, the live view provides real-time telemetry monitoring through ROS topics, supplying system statistics, performance updates, and emergency indicators during flight events.

#044 - Mangum, Kyla

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Daniel Carruth, CAVS Research
Co-Author(s): Christopher Hudson
Funding: Army Ground Vehicle Center and The Uni. of Michigan Research Center | **Project Category:** Engineering

Simulating Cyber Attacks on LiDAR Sensors of Autonomous Vehicles
LiDAR (Light Detection and Ranging) is a remote sensing technology that uses pulsed laser light to measure distances and generate high-resolution, three-dimensional representations of environments. LiDAR sensors play a critical role in autonomous vehicle systems by producing georeferenced point clouds used in world perception, environment mapping, and path planning. However, the LiDAR data pipeline contains several potential attack surfaces that could be exploited to degrade or disrupt autonomous operation. This work investigates how different classes of adversarial interference manifest in LiDAR point clouds and evaluates simulation-based methods for detecting these anomalies. Several adversarial techniques are examined, including denial-of-service attacks, data poisoning, laser spoofing, and noise injection, to characterize how malicious manipulation appears in the data pipeline. Using simulation, particularly man-in-the-middle denial-of-service attacks and data poisoning of raw point cloud data, we can create controlled, repeatable attack scenarios that support identification of attacks, evaluation of attack effects, and investigation of potential detection and mitigation approaches. Ongoing work focuses on demonstrating test attack simulations of noise injection and laser spoofing while developing corresponding detection and defense mechanisms.

#109 - Mansell, Matthew

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Aswathy Rai, Biochemistry Nutrition Health Promo
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Education

Understanding Student Perspectives on Artificial Intelligence in STEM Education: A Grounded Theory Study of Biochemistry Undergraduates
Artificial Intelligence (AI) in education is a point of contention for many. While it is rapidly growing, the student experience in higher education is changing right alongside it. Therefore, it is ever important that student feedback on AI is continuously measured as institutions find ways to integrate it into different aspects of education. This study investigates the changing perceptions of upperclassmen Biochemistry students (n = 178) across a two-year period. A grounded theory approach was used to analyze qualitative data. This allowed for the categorization of responses, moving from the raw survey results to a theoretical framework that captures the nuances of AI adoption in a rigorous STEM environment. The comparison between the 2025 and 2026 responses highlighted the shift in perspectives as AI became more integrated into their studies. In the 2025 phase, students were, for the most part, very certain that AI would be a great tool if used properly. The students in the 2026 cohort, though, demonstrated a much more "reluctant acceptance" of the reality of AI's growth and inevitability. These 2026 students have applied AI to specific Biochemistry-related tasks such as AlphaFold protein analysis, coding, and creating guides of metabolic pathways. A common complaint among this group was the accuracy and validity of the generative AI responses. Students, while generally accepting of the grammar correction and sentence structure tools, fear that an overreliance on these programs will lead to a decline in cognitive function. Critical thinking and creativity are particularly seen as "at-risk" traits. The difference in the 2025 and 2026 cohorts highlights these changes alongside emergent ethical concerns, such as environmental consequences. We conclude that institutions must do more than just ban the use of AI. These insights allow for potential institutional changes that ensure ethical and effective integration of AI.

#252 - Martinez, Michelle

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Peixin Fan, Animal & Dairy Science
Co-Author(s): Wilson Small, Jalyn Hawkins, Marcus McGee, Amelia Woolums
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Post-Regrouping Social Behavioral Dynamics in Lactating Holstein and Jersey Cows
Holstein and Jersey cows are the predominant breeds in the dairy industry, routinely exposed to regrouping, a social stressor that impacts performance. These breeds are often managed together, and there is limited research understanding breed-specific behaviors post- regrouping. In this study, 12 Holstein and 12 Jersey lactating cows, previously housed in three mixed-breed pens, were regrouped into two pens separated by breed for 30 d. Social

behavior was video-recorded for 3 wk (12 h/d, 4 d/wk) for agonistic and affiliative behaviors along with agonistic displacements to determine hierarchy using Normalized David's score. Behavioral data was analyzed using a linear mixed model with fixed effects of breed, week, breed x week, parity, and days in milk. Spearman correlations further assessed relationships among behavioral and host data. A total of 2131 and 2225 interactions were observed in Holsteins and Jerseys, respectively. Agonistic behaviors were most observed in lying stalls and licking was the most affiliative behavior observed. Cows previously housed in the same pens showed more affiliative and agonistic interactions with each other. Significant breed by week interactions were detected in agonistic and affiliative behaviors, and cows with a higher parity performed more and received less agonistic behaviors. Jerseys performed and received the fewest agonistic behaviors in wk 3 ($P<0.01$), which was not seen in Holsteins. Jerseys tended to perform more affiliative behaviors ($P=0.08$) and received more ($P<0.01$) than Holsteins in wk 1. Both breeds developed stable hierarchies, with Holsteins exhibiting greater steepness (-0.72) than Jerseys (-0.68). Dominance was positively associated with age, parity, body weight, and total agonistic behaviors performed, while subordinate cows received more agonistic behaviors. Subordinate Jerseys also received more affiliative behaviors. In conclusion, this study reveals breed differences in social dynamics after regrouping. Future studies should investigate targeted management strategies to improve post-regrouping outcomes.

#158 - Mattox, Anna

Major: Communication - Bachelor of Arts
Faculty Research Mentor: Zahed Arman, Communication
Co-Author(s): Abby Zupa, Charlotte Wise
Funding: None | **Project Category:** Social Sciences

Understanding Coffee Consumption Habits and the Effects of a 7Brew Location opening on The Coffee Depot Starkville, MS

The United States is one of the world's leading coffee consumers, and as consumption continues to rise, drinking trends continue to evolve ((Bellis, 2024, Vang, 2024). These changing trends lead to increases in market competition (Durbin, 2026). One of the stores driving competition is 7Brew, a drive thru chain with a unique menu and loyalty program (Wheless, 2025). The store has rapidly grown from one location in 2017 to 300 nationwide stores today (Wheless, 2025). In smaller communities, the introduction of a national, successful chain like 7Brew can significantly impact the local business (Filter-Coffee Parlor, 2025). This study examines how the imminent arrival of a 7BRew will affect The Coffee Depot, a popular local coffee shop in Starkville, Miss. By analyzing consumer habits, this research looks to help create a PR strategy to help make the potential negative impacts on The Coffee Depot's sales as small as possible. For this study, data information was collected through a survey sent out to Mississippi State University students and Starkville locals from March 2, 2026, March 6, 2026. Results revealed there are many factors that influence one's decision to attend a certain coffee shop. Most of our respondents said the reason they attended a coffee shop is to purchase a beverage, though most college students responded that they attend coffee shops to study as well as purchase a beverage. We found that WIFI, quiet instrumental music, drive-thru availability, price and taste/quality of beverages were all important factors that influence our audience's decision to attend a specific coffee shop. These findings will help Coffee Depot understand what influences customer choices and how to compete with 7Brew. The results can guide social media and marketing strategies to highlight what makes Coffee Depot unique and strengthen its connection with the community which will result in keeping customers loyal.

#159 - May, Jurdan

Major: Psychology - Bachelor of Arts
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: None | **Project Category:** Social Sciences

Paternal Involvement Related to Anxiety with a Moderating Factor of Paternal Authoritarian Parenting

The current study examined the relationship between paternal involvement and anxiety and whether paternal authoritarian parenting moderated that relation. It was hypothesized that paternal involvement and anxiety would be negatively associated. It was also hypothesized that paternal authoritarian parenting and anxiety would be positively associated. It was hypothesized that paternal authoritarian parenting would moderate the relation between paternal

involvement and anxiety by weakening the relation. Participants included 470 emerging adults who ranged in age from 18 to 25 years (M = 18.81, SD = 1.19). Participants reported on their gender (74.2% women, 25.8% men) and race (72.2% White, 23.3% Black, 0.6% Latino, 2.1% Asian or Asian American, 1.7% other). To measure parenting styles, participants completed the Parental Authority Questionnaire (Buri, 1991). To measure parental environment, participants completed the Parental Environment Questionnaire (Elkins et al., 1997). The Adult Self-Report (Achenbach & Rescorla, 2003) was used to measure psychological problems. The current study examined whether paternal involvement was related to anxiety and how it was moderated by authoritarian parenting style. Results showed that paternal involvement and authoritarian parenting were significant predictors of anxiety. The interaction between paternal involvement and authoritarian parenting was not significant. Future research should examine the effects of both paternal involvement and paternal authoritarian parenting on more symptoms of psychological disorders. Future research could also examine the effect of maternal involvement and maternal authoritarian parenting on anxiety.

#160 - McCluskey, Bennett

Major: Psychology - Bachelor of Arts
Faculty Research Mentor: Jonathon Whitlock, Psychology
Funding: None | **Project Category:** Social Sciences

The Effects of Background Music on Study Motivation and Productivity

Many college students report listening to music while studying to regulate mood and motivation, yet empirical research has produced mixed findings regarding its academic effects. While prior work has focused largely on productivity or cognitive performance, less attention has been given to students' self-perceived motivation during everyday study activities. The present exploratory study examined the relationship between background music and self-reported study motivation among undergraduate students. Fourteen undergraduate students (ages 19–27) completed an online questionnaire assessing study habits, frequency of listening to music while studying, preferred music genres, and perceived study motivation. All measures were self-reported. Pearson correlation analyses examined associations between frequency of music listening and motivation. An independent-samples t-test compared motivation between students who typically studied with music and those who did not. A one-way ANOVA tested whether motivation differed by preferred music genre. Frequency of listening to music while studying was strongly and positively correlated with self-reported study motivation, $r(12) = .82$, $p = .001$. Students who typically studied with music reported significantly higher motivation than those who did not, $t(12) = 4.14$, $p = .001$. Motivation did not differ significantly across preferred music genres, $F(5, 8) = 0.71$, $p = .636$. Overall, these findings provide evidence of an association between background music and increased self-reported study motivation among undergraduates. This research contributes to the broader discussion of motivation in young adults. Future research should employ larger, more diverse samples and experimental designs to examine causal relationships and objective academic outcome.

#253 - McDaniel, Avery

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Rezwan Tanvir, Biological Sciences
Co-Author(s): Ling Li, Rezwan Tanvir, Ling Li
Funding: None | **Project Category:** Biological and Life Sciences

QQS Functions as Both RNA and Protein to Regulate Starch and Protein Accumulation in Arabidopsis

QQS (Qua-Quine Starch) is an orphan gene unique to Arabidopsis thaliana that regulates carbon–nitrogen allocation, increasing total protein, decreasing starch, and enhancing resistance to pests and pathogens. Although these effects are well established, it remains unclear whether QQS functions through its encoded peptide, its RNA, or both. To address this question, we engineered Arabidopsis lines that selectively express QQS protein without native QQS RNA features (via synonymous codon substitutions) and lines that express QQS RNA without protein (by disrupting translation initiation). To further test RNA-based contributions, we also generated RNA-only constructs lacking introns and untranslated regions (UTRs). Using both Columbia-0 (Col-0) and qqs knockout backgrounds, we verified transcript presence or absence across genotypes by RT–qPCR. We then compared metabolic phenotypes using iodine

staining and quantitative assays for starch and total protein, with Col-0, qqs, and QQS-overexpression (QQS-OE) plants as controls. Plants expressing either QQS RNA or QQS protein displayed intermediate phenotypes: starch levels were lower than in qqs mutants but remained higher than in QQS-OE, while total protein was higher in qqs but lower than in QQS-OE. Together, these results support a model in which QQS regulates metabolism through both RNA- and protein-based functions. This work provides new insight into how an orphan gene can influence plant metabolism through dual molecular roles.

#110 - McDonald, Emma

Major: Kinesiology - Bachelor of Science
Faculty Research Mentor: Megan Holmes, Department of Kinesiology
Co-Author(s): Kevin Lorson, Megan Holmes, Kevin Lorson
Funding: None | **Project Category:** Education

An Evaluation of Recess Information Accessibility on Mississippi Elementary School Websites

Background: Currently, 42.4% of Mississippi children in elementary schools are overweight, and 23.9% are considered obese. The Mississippi Healthy Students Act of 2007 requires K-8 schools to provide 150 minutes of physical activity through a combination of physical education or school-based physical activity as an obesity prevention strategy. No recess-specific policy currently exists. The purpose of this study was to investigate whether Mississippi elementary school websites provide a schedule to determine allocated school-based physical activity time and accessible contact information for the physical education teacher(s) and principal. This information is needed for examination of recess as an avenue to address school-based physical activity. **Methods:** Mississippi elementary schools' websites (n=168) were reviewed to determine the availability of contact information for the principal and PE teacher, and the current school schedule to determine allocated time for recess and physical education. Frequency counts were calculated to determine the total number of schools providing relevant information. **Results**: A PE teacher was listed by 58.3% of schools, and a principal was listed for 96.4% of schools. No schools provided a schedule on their websites to determine allocated recess and PE time. The Mississippi Department of Education does not provide a public database of school-based physical activity. **Conclusion:** These findings support prioritization of the implementation of school-based physical activity opportunities within schools and ensure consistent integration into the academic environment. Limited publicly available information reflects a lack of transparency, highlighting the importance of stronger accountability measures at the school, district, and state levels. Standardized reports of recess schedules, PE programming, and overall physical activity opportunities are necessary to determine adherence to the Mississippi Healthy Students Act and reinforce the importance of school-based physical activity. Assessing schools' progress towards the requirements will identify gaps and develop support to implement Comprehensive School Physical Activity Programs (CSPAP).

#254 - McGee, Jacob

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Michael Sandel, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Kayla Fast
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evolutionary Conservation of Innate Immunity in Mississippi Fishes

Mycobacterium diseases have increased in prevalence over the last years. Notable among their hosts are species of vertebrate fishes (Teleost) and humans. Mycobacterium tuberculosis causes tuberculosis in humans, while Mycobacterium leprae and Mycobacterium lepromatosis cause leprosy. Similarly, various species of mycobacteria cause infections in fish are characterized by the development of granulomas, the appearance of ulcers, and general poor body condition. Various species of mycobacterium are capable of being zoonotically transferred. The objective of the study was to decide which mechanisms of the innate immune system in native Mississippian fish species are the most essential to providing resistance to mycobacterial pathogens. This was assessed by looking at orders of fishes that have a higher incidence of mycobacterial diseases and asserting that the higher incidence indicates either survival with these pathogens or susceptibility to these pathogens. After that, fin clip samples were collected from

multiple individuals representing each of the families within the chosen order (Cyprinodontiformes) that are endemic to Mississippi. DNA is extracted from these fin clips using Qiagen blood and tissue kit. Afterwards, an important piece of cellular innate immunity when dealing with bacterial infections, toll-like receptors, was selected to be amplified due to TLR2 specifically having a documented duplication event within Cyprinodontiformes and forming a complex that detects molecular sequences associated with mycobacteria. Forward and reverse TLR2 primers were used to isolate the strand of encoding DNA responsible for TLR2, and an appropriate Polymerase Chain Reaction protocol was developed to amplify the target segment. Finally, the PCR products were purified, sent to another lab for sequencing, and the sequences were used to create a phylogeny to assess the evolutionary history of these fishes through their immune systems. This study seeks to improve the understanding of fish immunity to emergent diseases and implications for human health and Mississippi fisheries.

#255 - Mearday, Keaura

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Linan Jia, Poultry Science
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evaluating the effects of genetically distinct avian pathogenic Escherichia coli strains on embryonic development and mortality

Avian Pathogenic Escherichia coli is a major bacterial pathogen in poultry that can significantly reduce embryo survival and overall hatchery success. The goal of this study was to evaluate how genetically distinct APEC strains influence the development and survival of chicken embryos. A total of 576 fertilized broiler eggs were incubated at 37.5 °C and 50-55% relative humidity with automatic turning. On day 12 of incubation, eggs were assigned to 24 treatments, including negative control (**NC**, sterile saline), unpunched eggs, dry-punched eggs, and 21 E. coli isolates representing diverse genetic backgrounds based on serogroup and whole-genome sequence. A total of six blocks were used, and within each block, four eggs were assigned to each treatment, resulting in 24 eggs per treatment. Each egg received a 0.1 mL inoculation (around 100-500 CFU of E. coli) into the allantoic cavity, and embryo mortality were monitored daily through day 18. On day 18 of incubation, egg and embryo weights were recorded for all surviving embryos. The 7-day mortality data were analyzed using two-proportion z-test against the NC with Holm adjustment, and survival embryo weight were compared by one-way ANOVA; statistical significance was set at $P \leq 0.05$. Among the 21 tested isolates, 5 showed no significant difference (P-values range from 0.110-0.336) from NC in embryo mortality, ranging from 8.3% to 16.7%, whereas 16 isolates exhibited significantly higher mortality rates, ranging from 20.8% to 83.3% ($P < 0.05$). Embryo weight analysis revealed that 15 isolates caused significantly lower embryo weights compared with the NC group ($P < 0.05$), indicating a consistent reduction in embryo growth among virulent strains. Early findings confirm that the virulence level varies substantially among APEC strains, with isolates have o-serogroups 2, 4, 17, 86, and 109 causing markedly higher embryo mortality and growth impairment than others.

#161 - Medeiros, Juliana

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Co-Author(s): Brianna Cox
Funding: None | **Project Category:** Social Sciences

Cold-heartedness and Emotion Dysregulation: The Moderating Factor of Paternal Disappointment

Velotti el al. (2024) conducted a systematic and meta-analysis search. The study indicates that there was an association between impairments of emotion regulation abilities and facets of psychopathy. The analyses indicated that emotion dysregulation is correlated to both lifestyle and affective components of psychopathy. Garofalo et al. (2021) performed a study that examined whether emotion dysregulation mediated psychopathy and aggression through self-reported measures. The study found that psychopathy had significant indirect effects on all aspects of aggression through emotion dysregulation, with the exception of verbal aggression. Gomis-Pomares el at. (2025) conducted further research where participants completed a

sociodemographic questionnaire, the Adverse Childhood Experiences Questionnaire, and the Youth Psychopathic Inventory. The results depicted that adverse childhood experiences (ACEs) increase the likelihood of psychopathic traits. Participants included 500 emerging adults who ranged in age from 18 to 26 years (M = 19.75, SD = 1.87). Participants reported on their gender (58.4% women, 41.6% men) and race (77.8% White, 15.0% Black, 2.2% Hispanic, 3.0% Asian or Asian American, 2.0% other). To measure cold-heartedness, participants completed the Psychopathic Personality Inventory (Lilienfeld et al., 2005). The Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004) was used to measure emotion dysregulation. Participants completed the Domains of Young Adult Discipline Scale (Walker & McKinney, 2021) to measure paternal disappointment. PROCESS 4.2 (Hayes, 2022) model 1 was used to conduct a moderation analysis. The model used to predict emotion dysregulation was significant, R^2 = .04, $F(3, 427) = 6.20$, $p < .001$. Cold-heartedness was negatively associated with emotion dysregulation, B = -0.72, SE = 0.22, $p < .001$. Paternal disappointment was positively associated with emotion dysregulation B = 0.22, SE = 0.08, p = .006. The interaction between cold-heartedness and paternal disappointment was not significant, B = -0.004, SE = 0.02, p = 0.85. This current study examined whether cold-heartedness was related to emotion dysregulation and how it was moderated by paternal disappointment. Results showed that cold-heartedness and paternal disappointment were significant predictors of emotion dysregulation. The interaction between cold-heartedness and paternal disappointment was not significant.

#045 - Milla, Nicole

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: George Trawick, Computer Science and Engineering
Funding: James Worth Bagley College of Engineering | **Project Category:** Engineering

Enhancing Cybersecurity Assessment Accessibility Using an AI Chatbot Platform

The increasing use of chatbots in recent years has highlighted the growing need for accessible and efficient information systems. Artificial intelligence–based chatbots are particularly effective at distilling complex information and providing actionable guidance to users. One important application is assisting organizations in verifying compliance with the U.S. Cybersecurity and Infrastructure Security Agency's (CISA) Cybersecurity Performance Goals (CPG). Many organizations face challenges when completing the CPG self-assessment due to limited technical expertise and resource constraints. This project addresses that gap by developing a free, customizable chatbot designed to guide users through each step of the CPG assessment process. The chatbot was developed using Python and integrates models hosted on Hugging Face to support natural language understanding and response generation. A user-friendly web interface was implemented using Streamlit, allowing users to interact with the system in an accessible and intuitive manner. The chatbot references official CPG documentation, frequently asked questions, and practical implementation scenarios to assist users in navigating the assessment. Initial testing and piloting of the system will be conducted with assessment leadership and trained assessors to evaluate usability, accuracy, and effectiveness in supporting the assessment workflow. The expected outcome is a more streamlined and accessible process for completing CPG assessments, reducing reliance on external consultants and strengthening cybersecurity readiness through improved adoption of CISA's foundational cybersecurity practices.

#162 - Miller, Henry

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Arazais Oliveros, Psychology
Co-Author(s): Kristina Schoenthaler
Funding: None | **Project Category:** Social Sciences

Perceived Benefits and Drawbacks of Culturally Informed Therapy

Western psychotherapeutic models often emphasize autonomy and firm interpersonal boundary-setting as mechanisms for psychological health. However, culturally informed approaches propose that therapy should contextualize distress within family systems with a heightened emphasis on values and collective identity. The present study examined how emerging adults perceive a culturally informed therapeutic response to familial conflict.

A total of 325 undergraduate participants were recruited via Mississippi State University's SONA research participation system. Participants were asked to read a vignette depicting a therapist who validated both the client's and their family's perspectives. Participants then provided open-ended reponses evaluating perceived benefits and drawbacks of this therapeutic approach to familial conflict. Data was analyzed using inductive thematic coding procedures to identify recurring patterns and higher-order themes. Results indicated that many participants perceived the approach as balanced, empathetic, and culturally sensitive. Frequently endorsed benefits included validation of the complexity of family systems, reduction of "family versus self" thinking, and promotion of reflective decision-making. However, perceived drawbacks included concerns about insufficient emphasis on personal autonomy, potential minimization of harm in maladaptive family systems, and ambiguity regarding how boundaries would be operationalized in practice. Findings suggest that culturally informed framing of boundaries may resonate with emerging adults but also evokes concerns about clarity and protection from relational harm. Implications for therapist training, multicultural competence, and integration of individualistic and collectivistic therapeutic values are discussed.

#256 - Miller, Mary Virginia

Major: Microbiology - Bachelor of Science
Faculty Research Mentor: Ling Li, Biological Sciences
Co-Author(s): Rezwan Tanvir, Rezwan Tanvir, Ling Li
Funding: NSF REU through the Department of Biological Sciences | **Project Category:** Biological and Life Sciences

Taxonomically Restricted *QQS* Associated 1 (*TRQA1*) Is Widely Expressed and Regulates Carbon and Nitrogen Allocation in Arabidopsis

The *Arabidopsis thaliana* orphan gene *QQS* (Qua-Quine Starch) regulates carbon and nitrogen allocation and has been shown to increase protein content, reduce starch accumulation, and enhance resistance to pests and pathogens across multiple plant species without yield penalties. However, the broader regulatory network underlying *QQS*-mediated metabolic modulation remains elusive. Through transcriptomic analysis, we identified Taxonomically Restricted *QQS* Associated 1 (*TRQA1*) as a candidate regulator whose expression is strongly upregulated when *QQS* is suppressed, suggesting a potential reciprocal regulatory relationship between *QQS* and *TRQA1*. To investigate *TRQA1* function, *Arabidopsis* lines were generated with altered *TRQA1* expression (overexpression, suppression, and knockout) and their metabolic phenotypes, growth, and yield were evaluated. In addition, *TRQA1* promoter-reporter lines were developed to characterize spatial and developmental expression patterns. Under standard growth conditions, *TRQA1* is broadly expressed across developmental stages, with particularly strong expression in cotyledons, radicles, vascular tissues, young leaves, shoot meristems, and root branching junctions, consistent with publicly available RNA-seq datasets. Functional analyses revealed that suppression of *TRQA1* increases total plant protein content and decreases starch accumulation without compromising plant growth or seed yield. In contrast, *TRQA1* overexpression produced the opposite trend, with elevated starch levels, reduced protein content, and negative effects on growth and seed yield. Together, these findings identify *TRQA1* as a previously uncharacterized regulator of carbon and nitrogen allocation and suggest that modulation of *TRQA1* activity may provide a strategy to improve plant nutritional quality through targeted metabolic rebalancing.

#046 - Mishra, Anoop

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Vuk Marojevic, Electrical and Computer Engineering
Co-Author(s): Aly Abdalla, Charles Ueltschey
Funding: National Telecommunications and Info. Admin. & Office of Naval Research | **Project Category:** Engineering

AI-Driven Automated Security Testing for 5G Networks: Natural Language Configuration Generation and Validation

The evolution toward Open Radio Access Network (O-RAN) architectures has introduced multi-vendor interoperability and software-defined flexibility, but it has also made security testing more complex and expertise-dependent. Manual

testing workflows require detailed knowledge of protocol specifications, SDR parameter ranges, and RF tuning, creating barriers that prevent systematic security evaluation across heterogeneous deployments.
This project presents an LLM-driven automated configuration generation framework that translates natural language security testing objectives into validated, executable test scenarios. The system implements a multi-agent pipeline where a Planner LLM extracts parameters and orchestration tasks from user prompts, a Validator enforces structural correctness, and an Executor LLM generates precise API calls and configuration files for containerized attack modules. To quantify LLM reliability for security-critical tasks, we evaluated five models (GPT-5, Qwen72B, DeepSeek, CodeLlama, TinyLlama) using an S-score metric that weights success rate by retry efficiency. Each model completed 10 trials generating test configurations, with outputs verified by a validator. GPT-5 achieved 100% planning accuracy with zero retries and 84% executor accuracy. Qwen72B and DeepSeek achieved perfect planning scores with 68% and 61% executor accuracies respectively. CodeLlama showed 65% planning accuracy and 14% executor accuracy. TinyLlama failed execution completely with 0% valid outputs due to insufficient context length. These findings demonstrate that LLM-driven automation eliminates the need for expert knowledge of 5G NR physical layer specifications, UHD APIs, and RF tuning parameters. A single natural language prompt can generate complete, validated test configurations that would otherwise require deep domain expertise, reducing manual setup complexity by approximately 70%. This approach is broadly applicable beyond 5G security testing and can be extended to other complex technical domains where expertise barriers limit accessibility and scalability.

#257 - Mobley, Portia

Major: Biological Sciences - Bachelor of Science
Faculty Research Mentor: Nathan Wisnoski, Biological Sciences
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Biological and Life Sciences

Seeds of Life Seen in Interstellar Metapopulations

The origins of life on Earth have been one of the greatest questions of humankind. To better understand this question, one can look to life in space. This is the basis of my research. I hope to connect study of life in space with the field of ecology, which has investigated the processes that regulate life on Earth. However, ecology has yet to be combined independently with the search into how life may have persisted in space. From the field of astrobiology, panspermia theory states that life exists throughout the universe and travels on meteoroids, asteroids, comets, and space dust. From ecology, metapopulation theory explains how a group of spatially separated populations of the same species interacts through migration. I am uniting these fields, viewing astrological material as habitat patches, to investigate the parameters that could support a unit of life in space through an ecological lens. An expected outcome of this research is to discover theoretical parameters that would allow a unit of life to survive in space, drawing connections between astrobiology and ecology that lead to a greater understanding of the origins of life. To test the given parameters, I am using stochastic simulation models to explore three scenarios of a solar system. In the first simulation, sources of life will only come from asteroids. These asteroids have the chance to hit the planets if they are within a certain radius, colonize the planet, go extinct, or be further dispersed throughout the solar system. Subsequent simulations will explore how patterns change when life can also come from X, or Y. We will then examine under which life persisted in the galaxy.

#047 - Mohamed, Abdulrehman

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Rahel Miralami, CAVS Research
Co-Author(s): Michael Murphy
Funding: ORED Undergraduate Research Program | **Project Category:** Engineering

Development and Validation of a Lumbar Spine Model for Vibration Analysis

Prolonged exposure to vehicular vibration has long been recognized as a critical occupational risk factor for lower back pain and spinal injury. Individuals working in transportation, construction, agriculture, and heavy machinery industries are particularly vulnerable, as daily exposure to vibration can accelerate spinal degeneration and contribute to chronic musculoskeletal disorders. Despite decades of epidemiological and experimental studies, the underlying

biomechanical mechanisms of vibration-induced spinal injury remain insufficiently understood. Computational modeling provides a powerful approach for bridging this knowledge gap by enabling controlled, ethical, and repeatable investigations of tissue-level responses that are otherwise difficult to measure in vivo. The objective of this research is to develop and validate a finite element (FE) model of the human lumbar spine, focusing on the L1–L5 region, to investigate spinal response under vibration-induced loading and to establish a framework for predicting potential injury mechanisms. This study contributes to advancing both computational biomechanics and occupational health by creating a lumbar-specific FE model that offers a balance between fidelity and computational efficiency. Unlike full-body human models, which are resource-intensive and often limited in resolution for specific regions, this focused model enables detailed analysis of stress, strain, and displacement in the lumbar vertebrae, intervertebral discs, and supporting ligaments. Ultimately, the validated model will serve as a versatile tool with applications in automotive safety design, ergonomic evaluation, and clinical decision-making

#048 - Mohammad, Alaa

Major: Computer Engineering - Bachelor of Science
Faculty Research Mentor: Jingdao Chen, Computer Science and Engineering
Co-Author(s): Yan Sun, Carter Holton, Dr. Jingdao Chen, Dr. Yan Sun, Dr. Lisa Thomas, Dr. Zhiqian Chen
Funding: NSF ITEST | **Project Category:** Engineering

Development of Accessible Machine Learning–Based Robotics Projects for Secondary Education
Machine learning and robotics are increasingly important in modern engineering education, yet exposure to these topics at the secondary level is often limited by technical complexity and resources. This research develops accessible, project-based robotics systems designed to introduce fundamental machine learning concepts to high school students through hands-on learning. The objective of this work is to design machine learning–enabled robotics projects that serve as instructional frameworks for secondary education. Projects were developed using Google Teachable Machine, a web-based platform for creating image classification models through labeled datasets without prior programming experience. This approach allows students to focus on data collection, labeling, model training, and inference while minimizing algorithmic complexity. Two primary projects were developed: a smart door system and an automated sorting machine. The smart door uses a Raspberry Pi 4, camera module, and stepper motor to demonstrate image-based access control, while the sorting machine employs a camera, servo, and DC motors to identify and separate objects in real time. Both systems incorporate custom 3D-printed components and low-cost electronics. Fully functional prototypes were completed and tested, and a companion webpage guide is being created to allow students anywhere to replicate the projects. These projects are currently being implemented within a mentorship-based educational program in which college-level mentors guide high school students through the design and construction of their own prototypes. This work highlights the effectiveness of low-barrier robotics-based projects in providing accessible, hands-on STEM learning for secondary students and demonstrates how project-based approaches can enhance understanding and engagement. Educational outcomes and implementation experiences will be discussed in the accompanying presentation.

#258 - Montoya, Molly

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Federico Hoffmann, Biochemistry Nutrition Health Promo
Co-Author(s): Florencia Meyer, Hunter Walt, Joseph Hinton, Santiago Cornejo, Brandi Karisch
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Transcriptomic Responses to Weaning: Identifying Differentially Expressed Genes in Abrupt vs. Fence-line Weaned Calves
Weaning is a major physiological stressor in calves that can influence immune function and vaccine responsiveness. Abrupt weaning involves the immediate and complete separation of calves from their dams, whereas fence-line weaning allows visual contact through a fence before full separation. This study compared the effects of abrupt weaning and fence-line weaning on physiological stress indicators, vaccine-induced immune responses, and gene expression patterns associated with innate and adaptive immunity. We hypothesized that fence-line weaned calves

would show reduced physiological stress and enhanced immune responses compared to abruptly weaned calves. Thirty-two beef calves were enrolled in the study, with 16 calves assigned to each weaning method. Calves received a primary vaccine dose (day -21) and a booster (day 0) before weaning. Buffy coat samples were collected at day 0, 5, and 28, corresponding to weaning (day 0), innate immune responses (day 5), and adaptive immune responses (day 28). RNA extraction was performed to evaluate differences in gene expression across weaning method and time. Preliminary transcriptomic analysis indicated that variation in gene expression was primarily associated with sampling timepoint rather than the weaning method. On day 0, we observed 43 DEGs with no functional enrichment. Few DEGs were detected between treatment groups on day 5. In contrast, we found a larger set of DEGs by day 28 that are enriched with immune-related functions. When assessing gene expression patterns, we found abruptly weaned calves exhibited higher expression of several immune-related genes compared to fence-line weaned calves. These findings suggest that weaning methods influence the expression of immune genes following vaccination and highlight the importance of management practices for immune development in calves. Future studies with larger sample sizes and associated physiological data will enhance our ability to detect treatment-associated transcriptional differences to further clarify the impact of weaning strategies on vaccine-induced immune responses.

#259 - Moore, Ameslee

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Ryan Folk, Biological Sciences
Co-Author(s): Tajinder Singh
Funding: NSF REU: Dr. Folk, Biological Sciences | **Project Category:** Biological and Life Sciences

Mapping male sterility traits using a genome-wide association approach

Plant fertility plays a critical role in reproductive success and agricultural productivity, as reduced fertility can directly impact seed production. Plant fertility is typically affected negatively by hybridization (the flow of genetic material between species), yet hybridization is one of the most important tools for introducing new traits into agriculture. One important component of plant fertility is pollen viability, which shape the male side of fertilization. This study investigates the genetic factors that influence pollen viability in *Heuchera* using a genome-wide association study (GWAS) approach. I am assessing fertility in a genetic mapping population, a second-generation hybrid population prepared from two parental species. I used genome resequencing data from this population (n = 131) to map sterility traits. To assess fertility, pollen samples are germinated and stained with aniline blue to distinguish viable from non-viable pollen, and the percentage of viable pollen is calculated to generate phenotypic data for genetic association tests. The data being collected will be used with the genome resequencing data to perform GWAS and generate Manhattan plots, which can be used to identify regions of the genome significantly associated with differences in pollen viability. Finally, the significant genomic regions will be examined for gene annotations involved in plant fertility. My **hypothesis** is that significant hits will represent nuclear genes that encode products expressed in the mitochondrion, and thus that cytoplasmic male sterility is the primary mechanism enforcing sterility barriers between the parental species. Data collection and statistical analysis are currently ongoing. This approach is expected to highlight genomic regions and candidate genes that may contribute to variation in fertility, which can then be compared to other species to identify general or lineage-specific mechanisms. Understanding the genetic basis of pollen viability will provide insight into plant reproductive biology and may support future breeding efforts.

#163 - Morgan, Emma

Major: Biological Sciences - Bachelor of Science
University: East Mississippi Community College
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: None | **Project Category:** Social Sciences

The Relation Between Adverse Childhood Experiences and Antisocial Problems Moderated by Negative Trauma Appraisal and Emotion Dysregulation

Research has supported the presence of adverse childhood events and impact on aggression and behavior problems with emotional dysregulation and negative trauma appraisal (Luijkx et al., 2024; Silva et al., 2024). Among these

studies, negative trauma appraisal and emotional dysregulation were associated with adverse childhood events and negative outcomes later in life, such as aggression and suicidal ideation (Ocakoğlu et al., 2023; Taylor et al., 2021). The current study examined the relation between adverse childhood experiences and antisocial problems in emerging adults, moderated by negative trauma appraisals and emotional dysregulation. **Participants** included 736 emerging adults who ranged in age from 18 to 28 years old (M = 18.84, SD = 1.41; 62.5% women, 37.4% men; 77.9% White, 15.6% Black, 2.3% Asian or Asian American, 4.2% other). Adverse childhood experiences were measured by the Adverse Childhood Experience Scale (ACEs, Felitti et al.,1998). Antisocial problems were measured by the Adult Self Report (ASR, Achenbach & Rescorla, 2003). Negative trauma appraisal was measured by the Trauma Appraisal Scale (TAQ, DePrince et al., 2010). Emotion dysregulation was measured by the Difficulties and Emotion Regulation Scale (DERS, Gratz & Roemer, 2004). **PROCESS**. 4.2 (Hayes, 2022) model 3 was used to conduct a moderation analysis using negative trauma appraisals and emotion dysregulation as moderators. The model predicting antisocial problems was significant, R^2 = .35, $F(7, 709)$ = 55.67, p < .001. Adverse childhood experiences were not associated with antisocial problems, B = 0.09, SE = 0.10, p = .39. Negative trauma appraisal was associated positively with antisocial problems, B = 0.05, SE = 0.006, p < .001. Emotion dysregulation was associated positively with antisocial psychological problems, B = 0.06, SE = 0.01, p < .001. None of the two-way interactions nor the three-way interactions were significant, suggesting only main effects without any interactive effects.

#164 - Morgan, Sarah

Major: Fashion Design & Merchandising - Bachelor of Science
Faculty Research Mentor: JuYoung Lee, School of Human Sciences
Co-Author(s): McKinley Morris, Katherine Null, Jordan Pullum
Funding: None | **Project Category:** Social Sciences

Style, Identity, and Belonging: Changes in the Way Men Dress After Entering College and Joining a Fraternity
Introduction / Research Problem.
Introduction. This study explores whether social pressure is related to changes in men's personal style, brand awareness, and clothing spending among fraternity members. During college, students often change their appearance to fit in with the people around them. Social pressure may lead people to change how they dress. This pressure can also increase awareness of clothing brands and influence spending habits. Fraternities create close social environments that may strengthen these pressures. We decided to choose this topic due to the lack of information on the topic and felt that it needed to be researched. **Research Objective and Hypotheses.** "How does joining a fraternity influence men's personal style, brand awareness, and spending through social pressure?"
H1: Perceived social pressure is positively associated with fraternity membership.
H2: Fraternity membership is positively associated with social pressure and brand awareness.
H3: Fraternity membership is positively associated with changes in social pressure and personal style.
H4: Fraternity membership is positively associated with social pressure and spending behavior.
Research Method. This study will look at the relationship between fraternity membership, social pressure, and changes in personal style, brand awareness, and clothing spending. The target population for this study are male college students who are current members of a fraternity. Data will be collected through an online survey that will be shared with fraternity members. The survey will include 22 questions about social pressure, style changes, brand awareness, and clothing spending. All questions will use a 5-point Likert-type scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). **Anticipated Results.** We anticipate to gather more information on how social pressure, in relation to fraternity membership, causes changes in personal style, spending, and brand awareness.

#165 - Morris, Molley

Major: Clinical Laboratory Sciences - Bachelor of Science
Faculty Research Mentor: Rubaiya Zannat, College of Arts & Sciences
Co-Author(s): Olivia Dickerson
Funding: None | **Project Category:** Social Sciences

Assessing Vaccine Awareness and Health Literacy Among College Students.
Vaccines prove to be one of the most effective strategies for preventing disease, however vaccine hesitancy and misinformation continue to influence discussions amount young adults. An anonymous survey will be used to collect data from undergraduate students at Mississippi State University. Participants will be asked questions such as their vaccination status, what they know about vaccines, and how likely they are to get new or recommended vaccines. This data will then be used to make the campaign as specific and effective as possible. Campaign messages will focus on improving vaccine awareness, providing a better understanding of health information, and giving others confidence in immunizations. Our intentions are to find the most effective way of promoting vaccine education and provide an influential campaign to initiate change and inform others. Health comm student granted an extension to March 20th.

#260 - Morris, Tucker

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Krish Krishnan, Agricultural Science & Plant Protec
Co-Author(s): Aswathy Rai
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Genetic Disruption of Neuromotor Pathways in a Drosophila Model of Cerebral Palsy
Cerebral palsy (CP) is the most prevalent neurodevelopmental disorder affecting motor function, with a global incidence of roughly 2–3 per 1,000 children. Its characteristic motor abnormalities—including spasticity, dystonia, choreoathetosis, and ataxia—arise early in development due to disturbances in brain maturation. Although environmental contributors such as prematurity, infection, hypoxia-ischemia, and perinatal stroke are well established, approximately 40% of CP cases remain idiopathic, strongly implicating underlying genetic factors. This aligns with patterns observed in other neurodevelopmental disorders. This study investigates two genes essential for neuromotor development in Drosophila melanogaster: **metro** (ménage à trois) and **Mrtf** (myocardin-related transcription factor). Metro is required for synaptic architecture at neuromuscular junctions (NMJs), and its loss results in reduced synaptic growth and structural abnormalities. Mrtf regulates smooth muscle differentiation and muscle-specific transcriptional programs; its deficiency disrupts NMJ development and muscle gene expression. Since sleep disturbances are highly prevalent in neurodevelopmental disorders—affecting 13–85% of children with CP—this work also examines how loss of these genes alters circadian sleep-wake behavior. Children with CP exhibit sleep-wake transition abnormalities, parasomnias, and excessive daytime sleepiness, with active epilepsy showing the strongest association with severe sleep disruption. To assess whether these mutations contribute to CP-like phenotypes, null mutants for each gene were analyzed alongside controls in circadian sleep behavioral assays. The study also evaluated how these mutations influence the expression of key interacting genes and proteins involved in neuromuscular development. Behavioral analyses indicate that loss of either gene produces phenotypes consistent with pathological features associated with CP, including disrupted sleep-wake activity patterns. These findings demonstrate that Drosophila provides a robust and tractable model for dissecting genetic pathways implicated in CP. This model offers a valuable platform for future mechanistic studies aimed at clarifying the molecular basis of idiopathic CP and identifying potential targets for therapeutic intervention.

#261 - Neal, Ariana

Major: Ag Educ., Leadership & Comm - Bachelor of Science
Faculty Research Mentor: Jessica Benson, School of Human Sciences
Funding: None | **Project Category:** Biological and Life Sciences

Curious, Cautious, or Confident? Generative AI in Ag Education and Extension.
Agricultural Extension agents and agricultural educators serve pivotal roles linking research, practice, and knowledge. However, increasing workloads, staffing shortages, and varying digital access make effective communication and teaching more challenging. As Generative Artificial Intelligence (GenAI) becomes more accessible, it presents opportunities to support instructional and outreach efforts, yet questions and mixed perceptions surround its use. This research project explored the awareness, experiences, and perceptions of Generative Artificial Intelligence (GenAI)

among Mississippi Extension agents and agricultural educators. Additionally, it identified ways Generative Artificial Intelligence (GenAI) could support professional responsibilities and explored training needs that might increase willingness and confidence. This research provides actionable insights for AI uses that bridge the gap between agricultural experts and their audiences, fostering agricultural literacy and informed decision-making across the industry.

#166 - Neal, Morgan

Major: Educational Psychology - Bachelor of Science
Faculty Research Mentor: Lourdes Cardozo Gaibisso, English
Co-Author(s): Savannah Stewart, Natalia Zambon Ferronato
Funding: ORED Undergraduate Research Program | **Project Category:** Social Sciences

BRIDGE TESOL

In-service ESOL teachers in Mississippi and Uruguay face limited access to sustained professional development, context-specific instructional challenges, and insufficient pedagogical support. BRIDGE TESOL (Building Regional Initiatives for Developing Global Educators for Teaching English to Speakers of Other Languages) was developed to address these needs through a collaborative, teacher-centered model of professional learning.
The program sought to reframe professional development as a co-constructive process rather than a top-down model that positions teachers as passive learners. Instead, participants engaged alongside facilitators to collaboratively build a context-responsive pedagogical framework grounded in language development, place-based instruction, assessment, and materials design. BRIDGE TESOL included four in-person professional development sessions (three in Uruguay and one in Mississippi), followed by a three-month international virtual Community of Inquiry (CoI) designed to promote sustained social and cognitive exchange. Data sources included classroom observations, teaching artifacts, online discussion boards, video submissions, and a transnational podcast component that supported reflective dialogue. Analysis focused on teacher engagement and enactment of the co-designed model rather than fidelity of implementation, examining how participants interpreted and adapted the framework within their local contexts. Findings underscore the transformative role of professional community. "Community" emerged as the most salient theme, with participants emphasizing collaboration, shared problem-solving, and mutual support. Teachers reported increased reflective practice, heightened professional confidence, and reduced feelings of isolation. The study demonstrates the potential of sustained, international Communities of Inquiry to foster meaningful professional growth and offers a scalable model for contextually grounded ESOL professional development.

#262 - Nelson, Caroline

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Krish Krishnan, Agricultural Science & Plant Protec
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Queuosine tRNA Deficiency Disrupts Sleep Patterns in Drosophila melanogaster

Transfer RNA (tRNA) supports protein synthesis through regulated transcription, processing, localization, and extensive chemical modification. These post-transcriptional changes occur at many base and sugar positions, shaping anticodon–codon pairing and ensuring translational accuracy. With more than 100 known modified nucleosides, tRNAs display substantial structural diversity. One notable modification, queuosine (Q), is a highly altered guanosine derivative found at position 34 of GUN anticodons in four tRNAs: tRNATyr, tRNAAsn, tRNAAsp, and tRNAHis. Q is widespread across organisms, and in animals its abundance correlates with stress responses, proliferation, and tumor biology, though its precise cellular function remains unresolved. Q incorporation is catalyzed by tRNA-guanine transglycosylase (TGTase), which replaces G34 with Q. In Drosophila melanogaster, TGTase contains a catalytic subunit (QTRT1) and an accessory subunit (QTRTD1). A putative salvage factor, DUF2419, may also contribute to Q-tRNA formation. We hypothesized that reducing QTRT1, QTRTD1, or DUF2419 expression would lower Q-tRNA levels. To test this, RNAi lines targeting each gene were crossed with a Ubi-GAL4 driver to generate progeny with systemic knockdown. Sleep–wake behavior and circadian rhythms were measured using the Drosophila Activity Monitor and

analyzed with Sleepmat (v2022.2). Across sleep metrics, circadian parameters, anticipatory activity, and eduction profiles, flies lacking Q-modified tRNAs showed clear disruptions in daily rhythmicity relative to controls. These behavioral abnormalities coincided with a substantial reduction in dopaminergic neurons and dopamine content. Since dopamine synthesis depends on tyrosine availability—and tyrosine production involves pathways requiring Q-modified tRNAs—our findings suggest that Q tRNA supports proper dopamine biosynthesis. Given dopamine's central role in arousal and circadian timing, loss of Q tRNA may impair the development or function of clock-associated neurons. We propose that Q tRNA is required to maintain neural circuitry underlying normal sleep–wake rhythms, and its absence leads to aberrant circadian behavior in Drosophila.

#167 - Neri, River

Major: Communication - Bachelor of Arts
Faculty Research Mentor: Zahed Arman, Communication
Co-Author(s): Abby Cochran, Ava Grace Ladner, Lydia Weigand, River Neri
Funding: None | **Project Category:** Social Sciences

"I Just Have to Have It" vs "Vace": Shopping & Overall Brand Image within Starkville Area

In Starkville, Mississippi, competition between local boutiques has become a prominent topic, particularly regarding which store may "reign supreme." This study examines how social media presence and marketing strategies shape consumer preferences and brand perceptions among local shoppers. For this study, a survey was distributed using a Google Forms questionnaire to residents of Starkville between the ages of 18 and 30. In addition, social media analytics were utilized to complement survey data and provide further insight into platform usage and engagement patterns. The survey was shared with individuals residing in Starkville to capture localized consumer perspectives. Data collection and analysis reveal the factors that are most important to buyers and identify which platforms are most effective in reaching consumers. Findings indicate that Instagram, Facebook, and TikTok are the most used platforms for shopping-related engagement in the fashion sector. Specifically, this study investigates how social media influences consumers' decisions to shop either in-store or online at two local boutiques. Results revealed that most respondents were between the ages of 18 and 25, indicating a younger consumer base driving boutique engagement. The findings further demonstrate that public relations and marketing strategies have a significant influence on shopping trends within the Starkville area. Overall, the study highlights that a strong social media and marketing presence plays a critical role in shaping consumer preferences and determining which boutique shoppers choose to support.

#168 - Newsom, Briyonna

Major: Microbiology - Bachelor of Science
Faculty Research Mentor: Rubaiya Zannat, College of Arts & Sciences
Co-Author(s): Allyson Cole
Funding: None | **Project Category:** Social Sciences

More Than a Women's Issue: A Health Campaign on Male Breast Cancer Awareness

A theory-based health communication campaign, titled "All In," was conducted in Starkville, Mississippi, to explore stigma, misinformation, and attitudes toward breast cancer in men. While breast cancer is often perceived as a women's health issue, men are also at risk, and their cases are more likely to go undetected due to low awareness and social stigma. This campaign primarily aimed to increase awareness, reduce misinformation, and encourage men to consider screening behaviors. To guide the campaign, an initial survey was conducted among men aged 25–50 to assess baseline knowledge and attitudes. Results showed that 75% of participants had little or no prior knowledge about male breast cancer, indicating a clear need for targeted communication. Based on these findings, digital campaign materials—including posters, flyers, and social media content—were developed using the Extended Parallel Process Model (EPPM) as the theoretical framework. Messages were designed to increase perceived severity and susceptibility while also strengthening response efficacy and self-efficacy. The campaign was implemented through online platforms such as Facebook, Instagram, and messaging channels. Over a two-week period, the campaign reached approximately 400 individuals and generated engagement through likes, comments, and shares. A follow-up

survey conducted after two weeks showed an increase in awareness, with participants reporting a mean score of 3.33 on intentions to seek screening in the future (on a 5-point Likert scale). Although this reflects a modest short-term impact, the campaign is still ongoing, and it is expected that continued exposure will further strengthen awareness, attitudes, and intentions toward screening. Overall, the findings suggest that a theory-driven, EPPM-based digital health campaign can effectively improve awareness and perceptions regarding male breast cancer, demonstrating the importance of inclusive and sustained health communication efforts.

#169 - Nichols, Elizabeth

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Michael Pratte, Psychology
Funding: None | **Project Category:** Social Sciences

The Soap Opera Effect: How High Video Refresh Rates Affect Perception

Video displays work by showing still images rapidly one after the other, creating the illusion of motion. Movies are typically displayed by showing about 30 such frames per second. However, in the past decade, new display technology has allowed televisions to show movies at much higher frame rates, such as 120 frames per second. These higher rates were developed to improve image quality, as they produced more accurate motion and reduced blur. However, despite their advantage, there has been a surprising unintended consequence of higher frame rates: many viewers report that movies shown at high frame rates look strangely artificial, often described as "fake" or "plastic." This phenomenon has been popularly termed the "Soap Opera Effect," as it resembles the visual appearance of soap operas which, unlike films, were historically recorded at higher frame rates typical of inexpensive video cameras 30 years ago. Despite receiving widespread attention in the film industry, there have been no scientific studies investigating why our visual systems react to high refresh rates in this bizarre way. Therefore, we showed participants two-minute clips from movies presented at both traditional frame rates (24 frames per second) and high frame rates (60 frames per second). While watching each clip, participants continuously rated how strongly they experienced the soap opera effect. These data are used to identify whether there are particular aspects of a video that tend to trigger the soap opera effect, such as lighting conditions or camera motion. In addition, we examined whether individual differences, such as experience with video games, influence how sensitive viewers are to experiencing the effect. Together, there results provide novel insights into how the human visual system interprets motion from a video display and may help guide the design of future display technologies that avoid these unintended perceptual effects.

#263 - Noruk, Josiah

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Fred Musser, Agricultural Science & Plant Protec
Co-Author(s): Alejandra Velez
Funding: Grant | **Project Category:** Biological and Life Sciences

What's for Dinner? Analyzing different diet types in rearing *Chrysoperla carnea* larvae

Chrysoperla carnea (Green lacewing) is a biological control agent found in agricultural systems and serves as an important component of Integrated Pest Management (IPM) of soft-bodied pests. Given its importance as a predator, we evaluated several insect diets as a food source to determine the most effective method for rearing this insect species. Second- instar *Chrysoperla carnea* larvae used were purchased from Sound Horticulture. The diets used in this experiment included *Tenebrio molitor* (as our control), *Helicoverpa zea* eggs and larvae, and *Chrysodeixis includens* eggs and larvae. The larvae were placed individually in diet cups containing their respective diets and then sealed with lids. Diets were renewed every two days, and larval survival and progression to the pupal stage were recorded. After comparing the diets, our results indicated that *Tenebrio molitor* and *Helicoverpa zea* eggs were the most effective at sustaining larval survival. These findings identify two cost-effective and accessible diets for the successful laboratory rearing of *C. carnea*.

#264 - Nwaokolo, David

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Meng Yang, Biochemistry Nutrition Health Promo
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Association Between E-cigarette Product Characteristics and Interest in Quitting E-cigarette Use among U.S. Young Adults

Background: E-cigarettes have become increasingly popular among young adults, yet they pose health risks, and reducing use remains a public health priority. Product characteristics—device type and nicotine concentration—may shape cessation interest. This study examines differences in quit interest across varying product characteristics. **Methods**: Data were drawn from the Wave 7 adult survey of the Population Assessment of Tobacco and Health (PATH) Study (2022 to 2023). The sample included young adults aged 18 to 24 who currently used e-cigarettes (N=2,392). High quit interest was defined using the 1 to 10 quit interest scale, with scores of 8 to 10 coded as high and scores of 1 to 7 coded as low. E-cigarette product characteristics included device type (disposable, pod, tank, and mod), flavor (tobacco/menthol vs. non-tobacco/menthol), nicotine concentration (<50 mg/mL vs. ≥50 mg/mL), and nicotine formulation (freebase vs. nicotine salt). Multivariable logistic regression estimated associations between product characteristics and high quit interest, adjusting for sex and past 30-day cigarette smoking. **Results**: About one-third of participants reported a high interest in quitting. High quit interest varied modestly by device type, with disposable and mod system users showing higher levels of quit interest in descriptive comparisons. Quit interest was slightly higher among those using nicotine concentrations below 50 mg/mL. In adjusted logistic regression, refillable tank only users had lower odds of high quit interest compared with disposable only users (OR=0.55, $p<0.05$). Females (OR=1.39, $p<0.01$) and participants who did not smoke cigarettes in the past 30 days (OR=1.49, $p<0.01$ had higher odds of high quit interest. **Conclusions**: Our results suggest that device design and nicotine concentration may shape cessation interest. These patterns support future research and regulatory attention to device type and nicotine characteristics, and highlight opportunities to tailor cessation support for young adult users.

#049 - Odom, Jacob

Major: Chemical Engineering - Bachelor of Science
Faculty Research Mentor: Neeraj Rai, Chemical Engineering
Funding: BCoE Research Award | **Project Category:** Engineering

Impact of Exchange-Correlation Functional Choice on the Predicted Electronic Structure of Complex Halide Frameworks

Hybrid organic-inorganic perovskites have emerged as promising materials for optoelectronic applications due to their tunable band gaps and favorable electronic properties. However, accurate prediction of their electronic structure remains highly sensitive to the choice of exchange-correlation functional in density functional theory (DFT).
In this work, the electronic properties of the two-dimensional Ruddlesden-Popper hybrid double perovskites CAB-1 and CAB-2 are benchmarked using the generalized gradient approximation PBE and the hybrid functionals PBE0 and HSE06. The electronic density of states (DOS) and band structures are recalculated to evaluate how these different functionals impact predicted band gap magnitudes, band dispersion, and orbital character near the valence and conduction band edges. By extracting carrier effective masses from the band curvature, the functional dependence of the electronic structure is quantified. The comparison identifies the differences between semilocal and hybrid approaches, providing a clearer understanding of how functional choice dictates the predicted electronic behavior of complex frameworks.

#111 - Orr, Benjamin

Major: Kinesiology - Bachelor of Science
Faculty Research Mentor: Guillermo Oviedo, Department of Kinesiology
Co-Author(s): Vikaas Manjunath, Kya Davis, Vikaas Manjunath, Nathaniel Afirim, Cris Cordova, Guillermo Oviedo
Funding: None | **Project Category:** Education

A cross-gender pilot study on the relationship between cardiorespiratory fitness and central pulse wave velocity in healthy young adults

Background: Higher levels of cardiorespiratory fitness (CRF) relate to lower cardiovascular disease (CVD) risk. Carotid to femoral pulse wave velocity (cfPWV) is a marker of arterial stiffness and CVD risk. Research on CVD frequently focuses on adults and older adults. However, many risk factors for CVD emerge during adolescence and young adulthood. Therefore, we aimed to compare VO2 max and cfPWV in rural young individuals and analyze correlations between these variables. **Methods:** Fourteen participants (7 males, 7 females; age: 24.64 ± 4.41 y.o.) were recruited. We assessed anthropometric variables using an electronic scale. cfPWV was assessed using a non-invasive technique. All participants performed a maximal metabolic stress test on a treadmill to assess their VO2 max. Non-parametric tests were used to analyze differences between males and females and to assess possible correlation between variables. **Results**: VO_2 max was significantly higher in males than in females (absolute VO2: males = 3.40 ± 0.77 L/min; females = 2.17 ± 0.45 L/min; relative VO2: males = 46.31 ± 7.21 mL/kg/min, females = 35.7 ±7.01 mL/kg/min all $p < 0.05$). BMI showed no significant difference between gender (males = 24.24 ± 2.88 kg/m2, females = 23.84 ± 4.04 kg/m2; $p = 0.798$;). No significant sex differences were observed in cfPWV (males = 6 ± 0.41 m/s, females = 5.53 ± 0.61 m/s; $p = 0.274$;). No significant correlation exists between cfPWV and relative VO_2 max ($\rho = -0.21$, $p = 0.466$) whereas BMI showed a positive correlation ($\rho = 0.56$, $p = 0.039$). **Conclusion:** The results show that males had higher CRF) than females. The VO2 max values obtained for both groups in comparison to American College of Sports Medicine normative values were at average levels. BMI's correlation with cfPWV shows exercise and nutritional strategies should be implemented to maintain good cardiovascular health.

#265 - Orton, Elizabeth

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: David Van Den Heever, Ag & Bio Engineering
Funding: Bridgforth Scholarship | **Project Category:** Biological and Life Sciences

Developing Methods for Rapid Characterization of PVS and NVS at the Neural Level

Anxiety and depression are incredibly prevalent mental health disorders, affecting about 1 in 5 US adults. Finding biomarkers for those disorders is beneficial in their prevention and treatment. It has been found previously that individuals with anxiety exhibit hypervigilance towards threats, while those with depression display blunted responses to positive cues. This study aims to explore how FPVS using emotional faces and/or affective images can be used as a biomarker for anxiety and depression. To do this, eight FPVS paradigms were designed, with five including images from the OASIS (Open Affective Standardized Image Set) database that has already been evaluated for arousal and positive/negative affect, and three including facial emotion images from the racially mixed RADIATE (RAcially DIverse AffecTive Expression) database. Participants were recruited from the MSU student body who answered basic questionnaires about themselves then viewed the FPVS paradigms while an EEG was measuring their brain activity. The statistically significant results from this study have shown robust responses to erotic (high-arousal) images regardless of gender. In addition, the facial expression paradigms have shown lower responses than were indicated in preliminary research that used a single-race facial database, a finding that has inspired further research within our lab. As we continue to recruit and test participants, we aim to explore the differences in responses between participants with anxiety and depression and those without.

#170 - Pace, Nala

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: None | **Project Category:** Social Sciences

Community Violence and Adolescent Delinquency: Investigating the Buffering Effects of Parenting Styles

The present study examined whether parenting styles moderate the association between community violence exposure and adolescent delinquency. Prior research consistently links exposure to community violence and

maladaptive parenting styles to higher levels of externalizing behaviors (Pueyo et al., 2023; Xie & Zhang, 2025). Building on this literature, the current study tested whether these associations differ by parent gender (maternal vs. paternal) and parenting style (authoritative, authoritarian, permissive), providing a more nuanced understanding of family dynamics in the context of environmental risk. **Participants** were 499 emerging adults (Mage = 18.73, SD = 1.96), 73.7% female and 26.3% male. The sample was 73.8% White, 21.2% Black, and 5% identifying as Asian, Latino, or Other. Participants retrospectively reported on their first 16 years of life using the Survey of Children's Exposure to Community Violence (SCECV), the Parental Authority Questionnaire (PAQ), and the Self-Reported Delinquency Scale (SRD). After excluding cases with missing data, 480 participants were included in analyses. Moderation models were conducted using PROCESS v4.2 (Model 1), with SRD as the outcome and gender and race entered as covariates. Six separate models tested maternal and paternal authoritative, authoritarian, and permissive parenting. Across all models, exposure to community violence significantly predicted higher delinquency (B range = 0.36–0.45, all $p < .001$). Significant interaction effects emerged for maternal authoritative ($B = -0.02$, $p < .001$), paternal authoritative ($B = 0.01$, $p = .010$), paternal authoritarian ($B = 0.01$, $p = .008$), and paternal permissive ($B = 0.01$, $p = .015$) parenting. Simple slopes analyses indicated that maternal authoritative parenting buffered the relationship between violence exposure and delinquency, whereas paternal parenting styles intensified this association. These findings highlight the differential moderating roles of maternal and paternal parenting in the context of community violence exposure.

#266 - Parker, Erica

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Peixin Fan, Animal & Dairy Science
Co-Author(s): Michelle Martinez, Jalyn Hawkins, Himani Joshi, Chuan-Yu Hsu, Peixin Fan
Funding: USDA | **Project Category:** Biological and Life Sciences

Antimicrobial Resistance and Virulence Profiling of Cefotaxime-Resistant Enterobacteriaceae Isolated from Healthy and Diarrheic Neonatal Dairy Calves

Calf diarrhea is a major cause of morbidity and mortality in pre-weaned calves. The early microbiome of dairy calves has also been reported to serve as a reservoir of antimicrobial resistance genes (ARGs), potentially compromising conventional antibiotic treatments. Our previous study showed higher concentrations of bacteria resistant to cefotaxime, a third-generation cephalosporin not used in livestock, in diarrheic calves compared to healthy calves. In this study, five cefotaxime-resistant bacterial strains were isolated from each fecal sample collected on days 4, 14, and 30 from three diarrheic and three healthy Holstein-Angus crossbred neonatal calves on MacConkey agar supplemented with 4 µg/mL cefotaxime. Antimicrobial susceptibility testing (AST) was conducted against seven antibiotics (ampicillin, chloramphenicol, ciprofloxacin, cefotaxime, gentamicin, meropenem, and tetracycline) on a total of 32 strains, representing distinct colony morphologies from the same fecal samples, revealing seven distinct antimicrobial resistance phenotypes (ARPs). All strains were resistant to cefotaxime and ampicillin. The most prevalent phenotype, ARP1 (n = 14), showed additional resistance to chloramphenicol and tetracycline and was distributed across both healthy and diarrheic calves at all three sampling times. ARP3 strains (n = 2) exhibited resistance to most antibiotics, remaining susceptible only to meropenem and intermediate to ciprofloxacin. One ARP1 strain (PFS214) from a diarrheic calf and one ARP1 strain (PFS4) from a healthy calf were selected for whole-genome sequencing (WGS). Both strains are Escherichia coli. Genome analysis revealed 54 ARGs in PFS4 and 61 ARGs in PFS214, including extended-spectrum beta-lactamase (ESBL) genes CTX-M-32 and CTX-M-1. Notably, PFS214 also carried a higher number of virulence factors (VFs, n = 35) compared to PFS4 (n = 15), including F4 fimbrial genes. Ongoing work on genotyping additional strains will investigate the colocalization of ARGs and VFs and identify targets to limit the transmission of resistant and virulent bacteria in dairy calves.

#267 - Parrow, Landon

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Galen Collins, Biochemistry Nutrition Health Promo
Co-Author(s): Galen Collins
Funding: None | **Project Category:** Biological and Life Sciences

Building Yeast Genetic Constructs to Investigate DDI-Family Protease Function in Proteostasis Pathways
DNA damage–inducible proteins (DDI family) are emerging regulators of cellular protein quality control pathways. In yeast, Ddi1 has been shown to function as a ubiquitin-dependent protease involved in protein degradation, while the mammalian homolog DDI2 participates in proteasome stress signaling by activating the transcription factor NRF1 during proteasome inhibition (Koizumi et al., 2016; Yip et al., 2020). Despite increasing interest in DDI-family proteases, the functional relationships between DDI proteins and structurally related retroviral protease–like proteins remain incompletely understood. This project aims to generate yeast genetic constructs that will allow investigation of proteins related to the DDI protease family, including NRIP2, NRIP3, and ASPRV1, within a controlled experimental system. Gene inserts corresponding to NRIP3, ASPRV1, and additional candidate proteins were amplified by PCR using primers containing BamHI and ClaI restriction sites to enable directional cloning. PCR products were verified using agarose gel electrophoresis and subsequently digested alongside plasmid backbones (MTV004, MTV005, and MTV006) using restriction enzymes. Digested plasmids were gel-purified and ligated with amplified inserts using T4 DNA ligase. Ligation products were transformed into XL-1 Blue Escherichia coli and propagated under ampicillin selection. Successful transformants were expanded and preserved as glycerol stocks for long-term storage.
Initial results confirm successful amplification of NRIP3 and ASPRV1 inserts and generation of plasmid constructs containing NRIP3. Additional cloning efforts are ongoing to generate constructs for NRIP2 and Saccharomyces cerevisiae DDI1. In parallel, amplification of a URA3-based DDI1 knockout cassette is being performed to generate a Δddi1 yeast strain that will serve as the genetic background for rescue experiments. These constructs will ultimately allow comparative analysis of DDI-related proteins in yeast, providing insight into how retroviral protease–like proteins may influence cellular proteostasis and stress-response pathways.

#050 - Patel, Jay

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Coralie Rose, Inst for Clean Energy Technology
Co-Author(s): David Clark
Funding: ORED Undergraduate Research Program | **Project Category:** Engineering

Durability of Nuclear Containment Ventilation Materials to Fatigue and Highly Accelerated Life Testing
The reliability and longevity of materials used in nuclear facilities depends on their ability to withstand various environmental stressors. This research investigates the changes in material properties as a function of exposure, focusing on glass filtration media and gasket materials used in high efficiency particulate air (HEPA) filters in nuclear containment ventilation and filtration systems. An accelerated aging technique, Highly Accelerated Life Testing (HALT), is involved in determining critical fatigue boundaries and acceptable exposure limits. Fatigue treatment using cyclic stressors provide a resiliency profile for each material. Randomly selected specimens underwent systematic exposure to controlled stressors including thermal cycling, humidity variations, ozone exposure, and water soaking conditions for five days. A hot temperature step procedure was also performed to determine the operational limits of the material and provide information for failure analysis. The exposures were followed by determination of material properties using tensile strength and modulus, water repellency, and thickness testing for glass medium. Similarly, gasket materials were evaluated for tensile strength, compression recovery, and thickness variations under similar exposure conditions. Additionally, thermogravimetric analysis (TGA) was performed to assess thermal stability and quantify mass loss behavior of the glass fiber materials under controlled heating conditions. The analytical data obtained from the tests will enable regulatory agencies such as the Department of Energy, Nuclear Regulatory Commission, and the nuclear power industry to define duration and conditions of use for each material and assist manufacturers in developing advanced nuclear filters, enhancing public safety and safeguarding communities against harmful radiation leaks from nuclear waste treatment facilities.

#051 - Paudel, Pranavi

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Rahel Miralami, CAVS Research
Funding: ORED Undergraduate Research Program | **Project Category:** Engineering

Design Optimization of Semi-Open Catheter Shunts for the Treatment of Hydrocephalus
Hydrocephalus occurs when cerebrospinal fluid (CSF) accumulates within the brain's ventricles, increasing intracranial pressure and placing surrounding tissue at risk. Although ventriculoperitoneal (VP) shunts remain the standard treatment, long-term reliability continues to be a major issue. A large portion of shunt failures are caused by obstruction at the proximal catheter, often requiring revision surgery. Many of these blockages are linked to regions of stagnant or low-velocity flow inside the catheter, particularly near the closed tip.
This study focuses on evaluating semi-open proximal catheter designs as a potential strategy to improve flow behavior and reduce obstruction risk. Several geometric parameters are varied, including the catheter lumen diameter, hole diameter, spacing between inlet holes, and the overall configuration of the semi-open tip. While opening the tip may reduce stagnant flow regions, it may also introduce new risks, such as localized tissue interaction or elevated shear forces that could damage surrounding ventricular tissue.
To better understand these trade-offs, computational fluid dynamics (CFD) simulations are performed in ANSYS under physiologically relevant flow conditions. The analysis concentrates on wall shear stress distribution, velocity fields, and pressure gradients within the catheter. Special attention is given to identifying regions where shear stress is either too low (which may promote cell adhesion and debris accumulation) or excessively high (which may increase the risk of tissue injury). By systematically comparing multiple design variations, this work aims to identify catheter geometries that promote consistent CSF flow while minimizing obstruction and safety concerns. The results provide quantitative insight into how small geometric changes influence internal flow behavior and may help guide the design of more reliable VP shunt systems.

#052 - Phillippe, Robert

Major: Chemical Engineering - Bachelor of Science
Faculty Research Mentor: Santanu Kundu, Chemical Engineering
Funding: None | **Project Category:** Engineering

Engineering Conductive Pathways: Coaxial Electrospun P3HT Fibers
Engineering Conductive Pathways: Coaxial Electrospun P3HT Fibers
Robert Phillippe, Santanu Kundu
Stretchable electronic materials are vital for wearable sensors, electronic skin, flexible displays, and deformable photovoltaic devices. These systems face the ongoing challenge of maintaining conductivity during large deformations and repeated strain, as many conjugated polymers degrade in performance under strain. We fabricated stretchable coaxial fibers using electrospinning, featuring a semiconducting poly(3-hexylthiophene) (P3HT) shell and a polymeric polyethylene oxide (PEO) core. This core–shell structure allows the polymeric core to absorb strain while the shell maintains electrical pathways. The electrospun fibers have an average diameter of 1.2 μm and a conductivity of ~4.0 x 10^{-7} S cm^{-1}. This work demonstrates a practical approach for designing resilient, electrically stable polymer fibers for flexible and wearable electronic applications.

#171 - Phouasalith, Alice

Major: Psychology - Bachelor of Arts
Faculty Research Mentor: Arazais Oliveros, Psychology
Funding: None | **Project Category:** Social Sciences

School-Based Occupational Therapy in Multi-Tiered Systems of Supports: A Review of Effectiveness, Prevalence, and Implementation Barriers
Over half of school-age children (5-12 years) in the US have some functioning difficulties, meaning challenges in hearing, mobility, communication/comprehension, and behavior or learning (Weeks et al., 2025, WG/UNICEF, n.d), yet most schools do not have comprehensive specialized services. As a solution, a Multi-Tiered System of Supports (MTSS) delivers increasingly intensive, evidence-based interventions across universal, targeted, and individualized tiers (Harlacher & Bailey, 2025). When children's early difficulties are left unaddressed, they can worsen and lead to academic underachievement, discipline referrals, and difficulty forming social relationships (Lee & Gage, 2020, Sheridan et al., 2019). School-based occupational therapists (SBOTs) address many of these common functional

difficulties with evidence of creating more inclusive environments, improving motor skills correlated with academic achievement, and fostering social-emotional skills (Kramer-Roy et al., 2020, Ohl et al., 2013, Fox et al., 2020). Emerging research supports integrating school-based occupational therapy into a MTSS framework as a cost- and time-effective way to address problems early with fewer formal referrals and no waitlists (Missiuna et al., 2016). Despite that, the implementation of school-based occupational therapy in MTSS is very limited, let alone the integration of both (PBIS, n.d., BLS, 2023). The current systematic literature review identified relevant evidence syntheses and primary empirical studies across the past fifteen years using the following search terms: MTSS, tiers, school-based occupational therapists, and social-emotional learning. Preliminary results reveal eight publications that suggest benefits to occupational domains (fine motor, visual-motor, school discipline, academic achievement, and social-emotional skills) and five peer-reviewed articles that recognize application barriers. Results will be synthesized diagrammatically to facilitate future research that tracks the use and impact of tiered interventions, including OT. Implications for future directions and school application will be discussed in the context of official educational and labor statistics for the implementation of MTSS and OT services.

#053 - Pielich, Isabel

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Steve Elder, Ag & Bio Engineering
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Engineering

Polyphenol-Releasing In Situ-forming Matrix

Osteoarthritis (OA) is a common joint disease that causes the breakdown of cartilage at the end of a bone. We are developing Polyphenol-Releasing In Situ-forming Matrix (PRISM), a novel treatment that aims to slow the progression of OA in the knee. However, PRISM includes a solvent that could be cytotoxic to cartilage cells. To estimate the level of cytotoxicity after injection in the knee, we have created a continuous-flow bioreactor to simulate the rapid turnover rate of synovial fluid in the human knee. The solvent is expected to behave similarly to small, freely soluble molecules, which are cleared from the human knee extremely rapidly, on the order of only a few hours. A 30ml polysulfone chamber with lower inlet and upper outlet ports was connected to a peristaltic pump. Water-soluble green dye was used to simulate the solvent. After some volumetric flow rate calibration, the dye was added to the chamber while water without dye was pumped through the system for 5 hours in a non-recirculating fashion. The chamber contents were sampled every 30 minutes, and green dye concentration was determined using UV-Vis spectroscopy. Results indicate a dye half-life of approximately 1 hour and complete clearance from the bioreactor within 5 hours. Now, the bioreactor will be tested with living cartilage or isolated cartilage cells, substituting PRISM for the dye and culture medium for the water.

#054 - Pigott, Kayla

Major: Industrial Engineering - Bachelor of Science
Faculty Research Mentor: Jessica Gonzales-Vargas, Industrial and Systems Engineering
Co-Author(s): Anabelle Lawson, Katherine Rigdon, Alaina Herrington, Jessica Gonzalez-Vargas
Funding: None | **Project Category:** Engineering

What Are You Looking At? Examining Visual Attention, Cognitive Workload, and Self-Efficacy in Intrapartum and Postpartum Simulation-Based Nursing Training

Simulation-based training (SBT) is widely recognized as a key strategy for developing clinical and procedural competence in nursing education. Through structured, deliberate, and repetitive practice, immersive simulations help nursing students internalize mental frameworks, translating academic knowledge into applied skills. Prior research has shown that repeated simulation practice can reduce cognitive workload over time and facilitate a smoother transition from training to real-life clinical settings. However, when cognitive workload is high during simulation, excessive mental demands can impede learning and reduce performance efficiency. Furthermore, lower self-efficacy may exacerbate the effects of high cognitive workload, limiting students' confidence and ability to apply skills effectively. Despite these insights, existing research has focused on general nursing simulations, leaving a gap in understanding how high-stakes, time-sensitive scenarios such as intrapartum and postpartum care affect learners' cognitive

workload, self-efficacy, and attentional strategies. Thus, the purpose of this project is to examine and understand differences between novice students and expert faculty during Intrapartum, Postpartum, and Virtual Reality (VR) Postpartum SBT sessions, focusing on perceived cognitive workload and self-efficacy. To achieve this, students and faculty at the School of Nursing will complete the NASA Task Load Index (NASA-TLX) and self-efficacy surveys before and after each simulation session to evaluate changes in perceived workload and confidence. Additionally, a faculty expert will wear the Tobii Pro Glasses 3 eye tracker while performing each of the simulations to capture visual attention. This research integrates expert visual attention data, and self-reported cognitive workload and self-efficacy to characterize expert practice and distinguish it from novice learning. By analyzing these metrics, the study aims to identify areas for improvement in novice training and inform the design of instructional strategies that enhance skill acquisition, improve confidence, and promote effective attention management in SBT nursing education.

#055 - Powell, Christopher

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Sungu Kim, Mechanical Engineering
Co-Author(s): Sungu Kim
Funding: None | **Project Category:** Engineering

Resolution Limits of Stereolithography 3D Printing for Microfluidic Fabrication

Microfluidics manipulates microliter- to picoliter-scale samples with high precision, advancing biomedical engineering through applications such as point-of-care diagnostics, single-cell analysis, drug screening, and organ-on-a chip system. Because device performance depends heavily on fabrication quality and scalability, the methods used to manufacture microfluidic platforms are critical. Photolithography is the traditional fabrication method. However, it requires specialized equipment, costly materials, and access to a cleanroom environment. These requirements increase fabrication time and expense, limit accessibility for smaller laboratories, and constrain rapid prototyping and iterative design. Recent advances in 3D printing have introduced new possibilities for fabricating microfluidic channels by enabling rapid, low-cost, and accessible device production without cleanroom facilities. However, the achievable printing resolution remains a key limitation, restricting the minimum feature size and channel precision. In this study, we investigate the resolution limits of stereolithography based 3d printing through a parametric analysis aimed at surpassing the manufacturer reported minimum feature size of 200 um. Key parameters evaluated include layer height, exposure settings, print orientation, resin, channel geometry, and post curing conditions.
To evaluate fabrication performance, two complementary approaches are investigated: (1) direct fabrication of microfluidic channels using transparent photopolymer resin, and (2) fabrication of high-resolution molds for polydimethylsiloxane (PDMS) soft lithography. Device fidelity and feature resolution are characterized using optical scanning measurements, and functional performance is demonstrated through representative microfluidic devices, including a cascade concentration gradient generator and a micromixer. By establishing practical strategies to extend achievable resolution using accessible fabrication tools, this work aims to lower barriers to microfluidic device development and rapid prototyping. The findings support broader adoption of microfluidic technologies in resource-limited research and educational settings while enabling faster design iteration for biomedical and chemical engineering applications.

#172 - Pree, Madison

Major: Human Development & Family Sci - Bachelor of Science
Faculty Research Mentor: Minel Guler, School of Human Sciences
Co-Author(s): JuYoung Lee, Morgan Hilfiker, Mia Plummer, Reese Willoughby
Funding: None | **Project Category:** Social Sciences

How Wearing Expressive Clothing in Social Settings Affects Self-Esteem and Confidence in Young Adults.

This study examines how expressive clothing influences self-esteem and confidence among young adults in social settings. The purpose of the research is to explore whether individuals who wear clothing that reflects their personal identity experience higher levels of self-esteem and social confidence when interacting with others. The research question guiding this study is: How do young adults' expressive clothing choices relate to their self-esteem and

confidence in social settings? The study hypothesizes that young adults who wear self-expressive clothing will demonstrate higher self-esteem and greater confidence in social environments compared to individuals who feel dissatisfied with their clothing or feel pressure to conform to social expectations. This study will use a quantitative research design with a cross-sectional online survey administered through Qualtrics. Participants will be young adults currently enrolled in universities in the United States. They will be recruited through social media platforms such as Instagram, LinkedIn, and GroupMe, as well as through university email lists and student organizations. The survey will measure three main constructs: self-expressive clothing, self-esteem, and confidence in social settings.
Self-expressive clothing will serve as the independent variable and will measure the extent to which individuals use clothing to express their personality, identity, and values. Participants will respond to several statements using a seven-point Likert scale ranging from strongly disagree to strongly agree. Self-esteem will be measured using statements that assess an individual's sense of self-worth, with responses ranging from strongly disagree to strongly agree on a four-point scale. Confidence in social settings will assess how comfortable participants feel in social situations and interactions with others. Data will be analyzed using SPSS. Pearson correlation analysis will examine relationships between expressive clothing, self-esteem, and social confidence. Multiple regression analysis will also be used to determine whether expressive clothing predicts levels of self-esteem and confidence among young adults.

#056 - Price, Gabriella

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Chris Goodin, CAVS Research
Co-Author(s): Christopher Hudson, Daniel Carruth, John Monroe, David McInnis
Funding: US Army Research and Development Center | **Project Category:** Engineering

Establishing a Database of Vegetation to be Used in Realistic Scene Generation for Autonomous Vehicle Simulations

Autonomous vehicles require the ability to perceive their environment just like any pilot of a manned vehicle. However, navigating offroad or complex terrain can make this difficult due to a number of factors, specifically vegetation. Vegetation can be hazardous to autonomous vehicles because it is hard to distinguish from solid objects and can also hide dangerous obstacles or terrain. Simulations can be used to optimize these vehicles for an offroad terrain without the risk of damage to the actual vehicle. Simulated scenarios can depict how an unmanned vehicle will react in certain situations and amongst different vegetations, allowing adjustments to be made without damage to the vehicle. For these scenarios to most accurately depict a vehicle's reactions, the scene needs to be as similar as possible to the real environment. MSU-CAVS created a biologically based scene generator to meet this need for realistic vegetated scenes. The simulator requires a database of this vegetation including both information about size, growth rates, blooming cycles, and 3D object files that are ready to integrate into a scene. For this project, I developed a database of vegetation for tropical terrains including information about the plant's hardiness zone, height range, growth rate, leaf and flower cycles, and life stages. This database will now be used to match these plants to meshes currently in our system.

#268 - Prince, Whitney

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Beth Baker, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Mark Hill
Funding: None | **Project Category:** Biological and Life Sciences

Environmental Evaluation of Bear Creek Watershed and Nonpoint Source Pollution

As the amount of land conversion increases to support the growing human population, water systems are facing an increasing amount of degradation due to nonpoint source pollution, the most significant source of water quality impairment in the United States. Nonpoint source pollution results from the runoff of excess fertilizers, herbicides, insecticides, oil, loose sediments, and animal waste. Nonpoint source pollution can degrade water quality, negatively affecting both aquatic and terrestrial life. This study aims to evaluate the Bear Creek Watershed in the Mississippi Delta, with specific research objectives aimed at identifying sources of nonpoint source pollution, water quality trends,

and targeted conservation practices to restore the watershed. The focus will be on surveying water quality, soil type, and land use trends within the watershed using data from state and federal agencies such as USGS, EPA, USDA, and MARIS. Landcover, soil type, and topographic data are being collected from satellite images and recorded soil surveys available on MARIS and the USDA Web Soil Surveys (WSS) websites, and it will be visualized using ArcGIS Pro. Nitrogen and phosphorus concentrations, estimated pollutant transport, precipitation, suspended sediment, pH, and dissolved oxygen levels are being collected from the Model My Watershed, How's My Waterway, and the USGS websites. Recent water sample data we have collected and analyzed from sites in the watershed will also be utilized. Literature analysis of water quality standards, policies, and management techniques will suggest future management recommendations to ensure the longevity of the watershed and the surrounding environment. Our assessment and recommendations can be used in outreach and engagement with local stakeholders in the area. This project will inform stakeholders and policy makers of the current conditions in the Bear Creek Watershed and if previous and current water quality management practices are effective in the Mississippi Delta.

#269 - Prisock, Dru

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Kelsey Harvey, Prairie Research Unit
Co-Author(s): Kelsey Harvey, Madeline McKnight, Brooklyn Laubinger, W. Isaac Jumper
Funding: None | **Project Category:** Biological and Life Sciences

A comparison of rumen fluid collection methods, either rumenocentesis or orogastric tubing, on volatile fatty acid concentrations in post-weaned beef steers

Volatile fatty acids (**VFA**) serve as a major energy source for cattle, supplying the primary source of metabolizable energy for cattle to support animal maintenance and growth. Their concentrations and relative proportions arise from rumen fermentation dynamics, with shifts in fermentation pathways influencing overall VFA supply available to the animal. However, limited research has compared the effects of different rumen fluid sampling methods on VFA profiles. The objective of this study was to evaluate differences in VFA concentrations obtained using two common rumen fluid collection techniques. Rumen fluid was collected from 12 randomly selected post-weaned steers via both rumenocentesis (**RC**) and orogastric tubing (**OT**) on day 56 of a preconditioning phase. Samples were analyzed for VFA concentrations via gas chromatography, and data were analyzed using the PROC MIXED function of SAS v.9.4. Acetate concentrations were greater ($P < 0.01$) in RC samples than OT samples. Butyrate concentrations were greater ($P = 0.04$) in RC vs. OT, and propionate concentrations were greater ($P < 0.01$) in RC vs. OT. Valerate concentrations tended ($P = 0.06$) to be greater in RC vs. OT samples. However, no differences were detected ($P \geq 0.30$) between collection techniques for isobutyrate or isovalerate. Moreover, the acetate:propionate ratio was decreased ($P = 0.03$) in RC calves compared to OT calves. These findings demonstrate that rumen fluid collection technique can influence measured VFA concentrations, underscoring the importance of technique selection when interpreting rumen fermentation data.

#270 - Raborn, Sarah

Major: Sustainable Bioproducts - Bachelor of Science
Faculty Research Mentor: Kristy McAndrew, FWRC - Forestry
Funding: None | **Project Category:** Biological and Life Sciences

Effect of a chitosan as a biostimulant and preventative fungal treatment for southern yellow pine seedlings

Effect of a chitosan as a biostimulant and preventative fungal treatment for southern yellow pine seedlings
Sarah A. Raborn[1], [2] and Kristy M. McAndrew[2]

1. Department of Sustainable Bioproducts, Mississippi State University
1. Department of Forestry, Mississippi State University

Southern yellow pine is of vital economic importance in the southeastern United States, consistently rating among the top three agricultural commodities in Mississippi. Brown spot needle blight is a fungal disease primarily caused by the ascomycetous pathogen *Lecanosticta acicola*. Symptoms include extreme needle browning and growth reduction in southern yellow pine species, in turn creating concern for pine growers in the southeastern United States. Existing

treatment recommendations for brown spot needle blight involve prescribed fire and fungicide applications in nursery settings, leaving a strong need for additional treatment plans and potential incorporation of non-toxic biostimulants into treatment regimes. Here, we tested the biostimulant chitosan in greenhouse and field environments, with control groups for comparison. In greenhouse studies, we treated slash (*Pinus elliottii*) pine seedlings with a chitosan foliar spray and measured height and diameter growth every week after treatment. In field studies, we treated loblolly pine (*Pinus taeda*) seedlings with a foliar spray and deployed them in sites with confirmed brown spot needle blight pressure, assessing them after a month of deployment for infection presence. This study aims to investigate the efficacy of chitosan to promote both i) improved seedling growth rates and ii) resistance to passive brown spot needle blight infection. The use of chitosan may prove a valuable treatment for southern yellow pine resistance to brown spot needle blight infection, potentially reducing economic loss while minimizing reliance on toxic fungicide treatments.

#271 - Rawlinson, Daniel

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Seung-Joon Ahn, Biochemistry Nutrition Health Promo
Co-Author(s): Courtney Wynn
Funding: ORED Undergraduate Research Program | **Project Category:** Biological and Life Sciences

Molecular characterization and functional analysis of the PBAN signaling pathway in the soybean looper, *Chrysodeixis includens*

The soybean looper, *Chrysodeixis includens*, is a major defoliating pest of soybean and other economically important crops in the United States. While pheromone biosynthesis activating neuropeptide (PBAN) signaling regulates sex pheromone production in many moth species, the PBAN gene and its receptor (PBANR) remain poorly characterized in this insect. This study aims to molecularly characterize the PBAN signaling pathway in soybean looper and establish foundational knowledge for future functional analyses. We cloned and sequenced the PBAN receptor (PBANR) gene and generated expression constructs for heterologous expression in Sf9 insect cells to facilitate future ligand–receptor interaction assays. Stable cell lines were prepared for downstream receptor characterization. To better understand endogenous PBAN signaling, we conducted gene expression profiling across developmental stages, six larval tissues, and discrete regions of the central nervous system (brain, thorax, abdomen). This data provides insight into spatial and temporal patterns of PBAN and PBANR expressions. To investigate potential functional roles in pheromone regulation, we synthesized double-stranded RNA (dsRNA) targeting PBAN pathway components for RNA interference (RNAi) studies. Preliminary pheromone profiling using gas chromatography–mass spectrometry (GC–MS) was conducted over a 24-hour period following adult emergence and across five consecutive days. These analyses established baseline pheromone production dynamics and identified optimal timing for RNAi injections relative to endogenous pheromone levels. Collectively, this work establishes the molecular framework necessary to investigate PBAN-mediated pheromone regulation in soybean looper and lays the groundwork for future studies exploring neuroendocrine regulation as a potential target for pest management strategies.

#272 - Raynor, Madeline

Major: Chemical Engineering - Bachelor of Science
Faculty Research Mentor: Erika Womack-Peoples, Mississippi State Chemical Lab
Co-Author(s): Chiquita Price, Christina Childers, Elizabeth Esser, Ashley Schulz, Gary Ervin, Rima Lucardi
Funding: None | **Project Category:** Biological and Life Sciences

Comparison of Sample Preparation Techniques for the Analysis of Chemical Characterization of Cogongrass

Cogongrass (Imperata cylindrica) is an invasive weed native to Asia that has become widespread throughout the southern United States. Due to its rapid spread via seed and rhizome, cogongrass now infests millions of acres worldwide and is difficult to manage using mechanical removal or chemical control alone. Recent studies indicate that invasive plants may exhibit autotoxic properties, which may be helpful in finding preventative measures to stop the spread of cogongrass. However, little research has been conducted on autotoxic properties of cogongrass, prompting further investigation into the compounds that may be responsible for potential autotoxicity in cogongrass. The

purpose of this experiment was to compare three methods of preparing cogongrass rhizome samples for chemical analysis: scissor chopping, blending, and cryogrinding. By determining which technique yielded the most detected compounds with high confidence using high-resolution liquid chromatography mass spectrometry (HRMS-LC), the optimal sample preparation method could be identified for future remediation analyses of cogongrass. Each rhizome sample was either cut into 1-inch-long pieces using scissors, blended into fibers using a Ninja Professional Blender, or cryogrinded into a powder using dry ice. Compounds were extracted using Optima graded water or ethanol. Using ThermoFisher Compound Discoverer, differential analysis compared the group areas of detected chemical compounds between each preparation technique and solvent extraction combination. The samples contained 2-Isopropyl-9H-thioxanthen, oleic acid, 5′-S-methyl-5′-thioadenosine, azelaic acid, beta-ionone epoxide, bis(2-ethylhexyl) sebacate, deoxyphomalone, dodecyl sulfate, erucamide, ethyl oleate, gabapentin, glycerol monopalmitate, and linoleoyl ethanolamide. Among these, azelaic acid and beta-ionone epoxide show promising autotoxic properties. On average, water with scissor chopping produced the lowest group area, while Ninja blending with ethanol extraction produced the highest, making it the most effective method. Future research should explore use of other solvents for extraction of autotoxins, and assess autotoxic potential of resulting compounds.

#173 - Reasons, Kyle

Major: Supply Chain Logistics - Bachelor of Business Adm
Faculty Research Mentor: Blake Lehman, English
Funding: ORED Undergraduate Research Program | **Project Category:** Social Sciences

Hän Language Documentation & Phonological Analysis

This research project is a phonological analysis on the Hän language and sought to categorize and provide a corpus of the language for future use. Hän is an indigenous Athabaskan language spoken around the Alaska/Yukon area; it is currently classified as an endangered language and spoken by fewer than 10 people. The purpose of this research is to not only increase the sparse documentation of the language but also to investigate tonal phonology and patterns within the language. The language data in this research project was collected via 20 hours of recordings of native speakers, transcribed in the transcription software ELAN (Max Planck Institute for Psycholinguistics 2025) based on notes from recording sessions and native speaker input, and then segmented and analyzed within the phonetics software Praat (Boersma and Weenink 2026). Transcription in ELAN consists of an analysis of specific segments of the audio recording eliciting certain phrases form native speakers, inputting the phrase in Hän as well as a translation of the phrase into English. After being transcribed in ELAN, it is then exported to Praat for further phonological analysis of the specific sounds contained in phrases and how vowel tones may change in certain contexts. It is expected that these analyses will help provide more convenient analyses for future linguists as it makes the corpus of data more accessible and easier to use compared to hours of recordings with no accompanying transcriptions or notes. Additionally, it is expected that these recordings will help contribute to a deeper understanding of the language and its relation to other Athabaskan or related language families for future linguists use as well as educate any interested learners or communities of the language and its significance.

#273 - Reese, Mackenzie

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Jessica Halfen, Animal & Dairy Science
Co-Author(s): Allison Goodson, Marcos Galvan Galvan, Francieli Dell'Osbel, Kandy Tilley
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Evaluation of Muscadine Grape Pomace Phenolic Compounds on TNF-α Production in LPS-Stimulated RAW 264.7 Macrophages

This study evaluated muscadine grape pomace (MGP) derived phenolic compounds (PC) as natural antioxidant compounds in murine RAW 264.7 macrophages challenged with lipopolysaccharide (LPS). PC were extracted from dried, ground muscadine grapes utilizing ethanol and water as solvents. RAW 264.7 cells, cultured in 75 cm^2 flasks to 85% confluency, were plated at 50,000 cells/well in a clear 96-well plate, and incubated for 16h at 37°C with 5% CO_2. Cells were preincubated with or without PC for 6h, and then treated with or without LPS (100 ng/mL) for 12h. Cells

were assigned to the following treatments: control (media only), LPS (media+LPS), MGP (200 µg/m+LPS), or cyanidin-3-glucoside (CYD; 10 µg/mL+LPS). Cell supernatants were collected, stored at –80°C, and Tumor Necrosis Factor Alpha (TNF-α) was quantified using the Mouse TNF-alpha DuoSet ELISA (R&D Systems, Minneapolis, Minnesota). Data was analyzed using the MIXED procedure of SAS, including a total of 4 replicates, with TNF-α expressed as pg/mL. There was a tendency for treatment effect (trt, P = 0.08), with MGP (1323.4 ± 183.5), CYD (1226.2 ± 170.0), and LPS (1226.2 ± 170.0) exhibiting higher TNF-α concentrations than CON (739.3 ± 102.5). As expected, a main effect of time was observed (P < 0.01), with higher TNF-α concentrations during the 12h LPS challenge compared with 6h of treatment (814.6 ± 56.5 and 1499.2 ± 103.9, respectively). No trt × time interaction was observed (P > 0.05), indicating that TNF-α changed similarly over time across all treatments. These results suggest that MGP did not attenuate LPS-induced TNF-α production under the current conditions. Future studies will evaluate a higher PC dose and/or a stronger LPS challenge and confirm pathway activation to better assess anti-inflammatory activity.

#274 - Reeves, Nathan

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Taylor Heckman, Delta Research and Extension Center
Co-Author(s): Joshua Bumgarner, Ayushma Sharma, Miguel Montufar, Esteban Soto, Matt Griffin
Funding: College of Forest Resources URSP | **Project Category:** Biological and Life Sciences

Lactococcus petauri* Virulence in Channel Catfish *(Ictalurus punctatus)

Infections caused by *Lactococcus petauri* have emerged as a concern in catfish aquaculture, yet their pathogenic potential under typical production conditions remains unclear. We conducted controlled laboratory challenges to evaluate dose response, strain differences, and the role of stress in disease expression. In Experiment 1, fingerling channel catfish *(Ictalurus punctatus)* were injected with increasing doses ($1 \times 10^5 – 1 \times 10^7$ CFU/fish) of either a catfish-derived isolate (R21-74 AL-1) or a trout-derived isolate (UCD-JR1) and monitored for 21 days at 27 ± 2°C. Mortality was minimal for both strains, with only isolated deaths between 11–18 days post-challenge. Bacteria were recovered from all mortalities, and limited persistence was detected only in the brains of survivors challenged with AL-1, while no bacteria were recovered from negative controls. Given the low mortality observed, Experiment 2 assessed the effect of a brief net-stress event prior to high-dose challenge (1×10^8 CFU/fish) with AL-1. Although mortality remained low, external lesions were common among challenged fish, peaking at 10 days post-challenge in 25–45% of unstressed and 40–45% of stressed fish, with stressed fish exhibiting greater lesion persistence and no lesions observed in controls. A temperature challenge comparing AL-1 infection dynamics at 25°C and 30°C similarly did not elevate disease severity. Collectively, these findings indicate that *L. petauri* functions as an opportunistic pathogen in channel catfish, producing limited mortality in healthy fish but exhibiting observable lesions at high doses, particularly following acute stress. Ongoing work will evaluate the effects of additional environmental and host factors on bacterial virulence and persistence to inform disease management in catfish production systems.

#275 - Reid, Lillie

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Jocelyn Bodmer, Animal & Dairy Science
Co-Author(s): Christy Bratcher, Zane Layton
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Investigating Heat Stress Induced Alterations in Muscle Metabolism and Growth

Heat stress is a major environmental challenge affecting livestock production worldwide. Prolonged exposure to elevated temperatures reduces feed intake, slows growth, alters skeletal muscle metabolism, and compromises overall animal health and productivity. Skeletal muscle is particularly sensitive to thermal stress due to its high metabolic demand. Heat stress has been shown to disrupt protein turnover, oxidative balance, and energy metabolism, with consequences for growth performance and meat quality. This study utilizes rabbits as a model for larger livestock species to explore how heat stress alters skeletal muscle metabolism in animals with contrasting growth rates. Post-weaning rabbits were assigned to a randomized experimental design with four treatment groups: high growth rate non-heat stress, high growth rate heat stress, low growth rate non-heat stress, and low growth rate heat stress. New

Zealand rabbits served as the high growth rate model, while Mini Rex rabbits represented the low growth rate model. Animals were housed in temperature-controlled environments, with heat-stressed rabbits exposed to 75°F and non-heat-stressed rabbits maintained at 68°F. All rabbits were fed a standardized diet to minimize dietary variation. Rabbits were weighed and harvested at eight and sixteen weeks of age. Skeletal muscle samples from the longissimus dorsi (LD), biceps femoris (BF) and liver samples were collected immediately postmortem. The LD and BF samples were collected again post-rigor at 24 hours. In progress initial assays include measurements of muscle pH, lactate, glycogen, glucose, and glucose-6-phosphate concentrations to evaluate glycolytic activity and energy metabolism. As well as glycogen concentrations of the liver samples. Understanding heat stress–induced metabolic adaptations, particularly in relation to growth rate, may provide insight into mechanisms underlying altered muscle development, animal productivity, and meat quality under thermal stress conditions.

#057 - Rich, Jazmaree

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Daniel Carruth, CAVS Research
Co-Author(s): Timothy Sellers
Funding: ORED Undergraduate Research Program | **Project Category:** Engineering

Modernizing Autonomous Vehicle Path Planning Through MATLAB-to-Python Translation

At the Center for Advanced Vehicular Systems (CAVS), this project examines how an existing MATLAB-based path-planning algorithm can be re-engineered for integration with CAVS autonomous vehicle software environment by translating it into Python. This project involves a detailed analysis of the original MATLAB code structure to understand the math, logic, and data flow contribute to vehicle navigation performance. The algorithm is then reconstructed using Python libraries and data structure to improve accuracy, computational efficiency and integration with contemporary autonomy software stacks. The goal is not only to replicate the functionality of the MATLAB algorithm, but also to assess how a Python implementation can improve readability and computational efficiency. Throughout the conversion process, the Python version is tested to ensure that the work preserves the original planning behavior while enabling more efficient execution. This work contributes to advancing autonomous systems research by providing a more adaptable and maintainable solution for path-planning within vehicle navigation and intelligent transportation applications.

#058 - Riggs, Garrett

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Sungu Kim, Mechanical Engineering
Funding: None | **Project Category:** Engineering

Self-Assembled Nanochannels for Selective Ion Transport

There is growing interest in ion transport through nanochannels due to applications in neuromorphic computing, sustainable energy generation, and bio-inspired sensing. Advances in nanofluidics enable precise control of ion and fluid transport, opening opportunities for energy-efficient and highly functional devices. However, nanochannel fabrication remains significantly more resource-intensive and costly than conventional microscale fabrication techniques. To overcome this challenge, we study nanochannels formed by a self-assembled packed bed within a microscale channel. Our model geometry consists of two parallel microchannels connected by a nanojunction. To fabricate the nanojunction, a nanoparticle suspension is introduced into one microchannel, while the other remains empty. The suspension fills the junction but does not advance into the empty channel due to capillary forces. Solvent evaporation toward the empty microchannel drives continuous nanoparticle influx into the junction, forming a densely packed bed. After drying, this process produces a porous structure with nanoscale pore sizes that functions as a nanochannel. Ion transport through the self-assembled nanochannel is assessed using electrokinetic measurements by applying a voltage bias across the microchannels and measuring the resulting ionic current. Due to the nanoscale pore size and surface charge of the packed bed, ion transport is governed by surface-charge–dominated conduction rather than bulk diffusion or convection. Consequently, the nanochannel exhibits nonlinear current–voltage behavior, including current rectification under asymmetric bias. Analysis of the I–V characteristics

allows evaluation of the ion transport properties of the self-assembled nanochannel. These results demonstrate a simple and scalable approach to creating nanochannels without complex nanofabrication. By using self-assembled packed beds in microscale devices, this work provides an accessible platform for studying nanoscale ion transport and promotes broader adoption of nanofluidic systems in research and education.

#119 - Roark, Elijah

Major: Communication - Bachelor of Arts
Faculty Research Mentor: Liz Hutchison, A&S/Gender Studies
Funding: None | **Project Category:** Humanities

"I'm becoming… confused again, aren't I?": Queer Repression and Monstrous Motherhood in the *Psycho* Franchise

This paper focuses on *Psycho* (1960) and its sequels (released in 1983, 1986, and 1992 respectively). More specifically, it explores the relationship between the character of Norman Bates and his actor, Anthony Perkins – primarily, his childhood relationship with his mother and his homosexuality. Using the concept of the "terrible place" from Carol Clover's *Men, Women, & Chainsaws* combined with the overbearing actions of Norma Bates, the first adaptation of Psycho succulently establish that the Bates home serves as a physical reminder of Norman's trauma and a basis for the personality of the Mother that holds sway over him. The sequels serve as almost a frozen in time bubble of the 1950s queer struggle, something that was likely entrenched in the soul of Perkins as a gay man who lived through that time as a public figure. While originally a one-off appearance meant to widen the scope of what he could do as an actor, he would spend the rest of his career reliving a form of his deepest troubles through Norman, letting him change as Perkins himself adjusted throughout his life. Alongside the real-world relationship between Norman and Perkins, I discuss academics who look at the horror genre, homosexuality in film, or both (such as Jack Babuscio and Harry Benshoff) in order to expound on how the Psycho franchise plays off these tropes.

#102 - Rogers, Drew

Major: Agribusiness - Bachelor of Science
Faculty Research Mentor: Kuan-Ming Huang, Agricultural Economics
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Business and Economics

Assessing Consumer Willingness to Pay for Flavor, Organic Labeling, and Premium Packaging: A Choice Experiment on Boiled Peanuts

Growing consumer interest in locally produced foods and value-added agricultural products has increased demand for differentiated food attributes such as organic labeling, specialty flavors, and premium packaging. While prior research has examined willingness to pay (WTP) for organic and packaging across various agricultural commodities, limited research has focused specifically on boiled peanuts, a culturally significant product in the southeastern United States that is commonly sold through direct-to-consumer markets. Understanding how consumers value specific product attributes is especially important for small-scale peanut producers seeking to increase profitability.
This study examines consumer willingness to pay for differentiated boiled peanut products using a choice experiment survey. The survey presents respondents with 6 purchasing scenarios in which they select between two one-pound packages of boiled peanuts that vary across four attributes: flavor (Original versus Cajun), packaging type (Ziplock bag versus premium stand-up pouch), organic labeling (USDA Organic Certified versus non-organic), and price ($3.00–$5.00 per pound). The survey includes a practice round to ensure comprehension before respondents complete the experimental choice tasks. Survey data collection will be concluded by the end of March, and we expect to collect 350 responses from consumers. Consumer WTP is estimated using a mixed logit model in WTP space, allowing direct interpretation of attribute-level WTP. Our preliminary results show positive WTP for organic labeling and premium packaging, with flavor preferences varying across consumers. Results from this study will provide practical guidance for small-scale farmers and farmers' market vendors by identifying which product attributes generate measurable price premiums, thereby supporting more informed marketing, packaging, and pricing decisions in local food systems.

#083 - Ross, Elaine

Major: Geoscience - Bachelor of Science
Faculty Research Mentor: Andrew Birkey, Geosciences
Funding: None | **Project Category:** Physical Sciences

Investigating the Negative Gravity Anomaly of the Altiplano-Puna Volcanic Complex via Seismic-Gravitational Joint-Inversion

The Altiplano-Puna Volcanic Complex (APVC) is a group of volcanoes located at the intersection of Bolivia, Chile, and Argentina in the Andes Mountain chain. It is situated between the Puna and Altiplano Plateaus, which host some of the thickest crust on Earth (~75 km). This area of the Central Andes formed as a result of the subduction of the oceanic Nazca Plate beneath the continental South American Plate, producing horizontal tectonic shortening of the upper plate. Geophysicists have identified a vast low-velocity zone, attributed to the relatively low density of the underlying material of the Puna and Altiplano Plateaus, and partial melting beneath the APVC. As an additional result of the lower densities, there is a negative gravity anomaly, meaning the gravitational acceleration is less than theoretically predicted, as gravitational acceleration changes with the density of the material beneath the measurement point. The observations presented here are based on previous seismic data that have been refined to show where subsurface velocities vary and clearly delineate our areas of interest. This data will be integrated with gravitational acceleration observations to create a well-constrained and detailed model of the subsurface beneath the APVC, in order to investigate the underlying crustal structure of the APVC and the plateaus to its north and south.

#174 - Rossi, Madeline

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: None | **Project Category:** Social Sciences

Relation Between Adverse Childhood Experiences and Interpersonal Competence Mediated by Emotion Dysregulation Across Gender

This study examined the relation between adverse childhood experiences (ACEs) and interpersonal competence mediated by emotion dysregulation across gender. **Participants** included 717 emerging adults (60.8% women; 78.4% White, 15.2% Black). Participants completed the Adverse Childhood Experiences Questionnaire (Felitti et al., 1998), the Difficulties in Emotion Regulation Scale (DERS; Gratz & Rosen, 2004), and the Interpersonal Competence Questionnaire (ICQ; Burmester et al., 1988). PROCESS 4.2 (Hayes, 2022) model 59 was used to conduct a moderated mediation analysis. The model predicting emotion dysregulation was significant, R^2= .38, F(3, 712) = 39.64, p < .001. ACEs was associated positively with emotion dysregulation, B = 3.03, SE = .64, p < .001. The model predicting interpersonal competence was significant, R^2 = .20, F(5, 710) = 35.89, p < .001. ACEs was associated positively with interpersonal competence, B = 1.10, SE = .66, p =.095. Emotion dysregulation was associated negatively with interpersonal competence, B = -.46, SE = .06, p < .001. Using 5,000 bootstrap resamples, for men the confidence interval for the indirect effect of ACEs on interpersonal competence through emotion dysregulation was entirely below zero, B = -1.40, SE = 0.36, 95% CI [-2.17, -0.75], suggesting a significant indirect effect. For women, the confidence interval for the indirect effect of ACEs on interpersonal competence through emotion dysregulation was entirely below zero, B = -1.89, SE = 0.33, 95% CI [-2.56, -1.25], suggesting a significant indirect effect. The index of moderated mediation was not entirely below zero, B = -0.48, SE = 0.49, 95% CI [-1.42, 0.49], suggesting the moderation was not significant. It was demonstrated that adverse childhood experiences was significantly associated with higher emotion dysregulation, which then was associated with lower interpersonal competence, suggesting that adverse childhood experiences could impact emotion dysregulation, which then may determine overall interpersonal competence.

#120 - Rounds, Lauren

Major: English - Bachelor of Arts
Faculty Research Mentor: Lara Dodds, English
Funding: None | **Project Category:** Humanities

The Beast Born of Beauty: A Study of Humanness through Beauty within *Frankenstein*

Mary Shelley's *Frankenstein* is often praised for its transformative approach in representing ugliness and monstrosity in literature. Previous scholarship has considered the novel an indirect commentary on 19th century attitudes towards race, noting the creature's monstrosity as an analogy for the extreme otherness of minorities in Western society. My research will explore the definition of beauty throughout the novel, noting the language and descriptions provided to the characters. As Shelley uses words such as "fair" and "light" as qualities of these beautiful characters who were considered innocent, the classic novel creates an exclusionary standard for beauty. Many societies considered beauty as a qualifier for value and status, and exclusionary standards of it cause great mistreatment and undervaluing of groups of people who do not fit into them, such as people of color. I consider these findings through the literary theory of "grievability," an idea introduced by Judith Butler in her novel *Frames of War: When is Life Grievable?*. According to Butler, "Grievability is a presupposition for the life that matters [...] Grievability precedes and makes possible the apprehension of the living being as living," (pp. 14-15). Butler makes the argument that in order for a person to be considered worthy of grief, their life must have been considered a life by others. Their life was, therefore, valuable enough to be deemed a loss. For many who are not considered to be beautiful, their lives are not considered as valuable. Thus, the definition of beauty in Mary Shelley's *Frankenstein* is harmful to people of color, due to them not fitting into the author's standards of beauty, deeming them invaluable and, subsequently, ungrievable, inhuman, and incapable of innocence.

#112 - Ruffin, Breaunna

Major: Kinesiology - Bachelor of Science
Faculty Research Mentor: Megan Holmes, Department of Kinesiology
Co-Author(s): Po-Lin Chen, Po-Lin Chen, Megan Holmes
Funding: None | **Project Category:** Education

The Relationship Between Body Fat Percentage, Physical Self-perception, and Fundamental Movement Skills in College-aged Adults

Fundamental movement skills are essential movement skill patterns that are foundational to all types of physical activity and typically developed by mid-adolescence. Additionally, movement skill performance can be influenced by an individual's perception of their physical ability to be active, as well as body composition. This study examined the relationship between fundamental movement skills, physical self-perception, and body composition in college-aged adults. Twenty college-aged adults (all females, aged 20.87 ± 0.61) were included in this study. Perception of personal ability to be physically active was examined using the Physical Self-Perception Profile (PSPP). Fundamental movement skills were assessed using the Test of Gross Motor Development, Third Edition (TGMD-3). Body fat percentage (BF%) was measured using Bioelectrical Impedance Analysis. Pearson Correlation Coefficient was used to evaluate the correlations amongst each variable. Significance level was set at $\alpha = .05$. Six participants did not reach the highest age equivalent (>10 years and 11 months) in locomotor sub-scale and five participants did not reach the highest age equivalent in ball skills sub-scale. Higher BF% was found to be significantly correlated with lower TGMD-3 locomotor sub-scale ($r = -.463$; $p = .04$), TGMD-3 ball-skills sub-scale ($r = -.488$; $p = .029$), and TGMD-3 total score ($r = -.537$; $p = .015$). Higher BF% was also shown to have significant correlation with lower PSPP total score ($r = -.545$; $p = .013$) and the physical condition sub-scale score ($r = -.585$; $p = .007$). About a quarter of young adults do not reach the proficiency barrier of fundamental movement skills. Physical self-perception did not impact performance of fundamental movement skills. However, BF% is negatively associated with physical self-perception and all types of

fundamental movement skills. Future analysis should examine physical activity to explore the possible relationship with BF% and movement performance.

#276 - Rutherford, Jessica

Major: Chemical Engineering - Bachelor of Science
Faculty Research Mentor: Nick Cochran, PI; Hudson Alpha Institute for Biotechnology
Co-Author(s): Jean-Francois Gout, Nick Cochran, Ashlyn Anderson
Funding: Hudson Alpha Institute for Biotechnology | **Project Category:** Biological and Life Sciences

Advancing Regulatory Genomics in Alzheimer's Disease with Machine Learning and Single-Cell Data Integration.

Alzheimer's disease (AD) is the most common neurodegenerative disorder, marked by memory loss, cognitive decline, and neuroinflammation. On a cellular level, AD is driven by the buildup of amyloid plaques and tau tangles that lead to neuronal damage and impaired communication between brain cells. However, the genomic mechanisms initiating these abnormalities remain largely unknown. Many AD-associated genetic variants identified by genome-wide association studies (GWAS) occur in non-coding DNA regions that contain cis-regulatory elements (CREs), such as enhancers, which control gene expression and may influence disease development. Functional modeling provides a way to link these regulatory regions to their target genes, advancing understanding of AD's genomic framework. ScE2G is a machine-learning framework designed to improve enhancer–gene modeling by integrating genomic data at a single-cell level. Its performance was benchmarked against standard industry models using a CRISPRi-validated dataset. The Cochran Lab at HudsonAlpha generated single-cell multiomic data from 15 post-mortem dorsolateral prefrontal cortex samples (7 AD, 8 controls). Chromatin accessibility (snATAC-seq) and gene-expression (snRNA-seq) data were preprocessed and input into ScE2G to predict enhancer–gene associations. Differentially expressed genes (DEGs) in microglia, cells closely linked to dementia, were identified and overlapped with AD risk variants from major GWAS to validate regulatory links. ScE2G demonstrated higher precision and recall in enhancer–gene link prediction, outperforming standard models. The analysis identified 14 genes that were both differentially expressed and located within ±50 bp of enhancer regions containing AD-associated variants. Among these were APOE and MAPT, two key contributors to neurodegeneration, providing biological validation of the model's predictions. ScE2G highlights the expanding role of computational biology in decoding the regulatory architecture underlying neurodegeneration and advancing therapeutic discovery and early detection of Alzheimer's disease.

#121 - Saben, Noah

Major: History - Bachelor of Arts
University: University of Connecticut
Faculty Research Mentor: Micki McElya, History
Funding: None | **Project Category:** Humanities

A Mississippi History of The Blues and (Modern) Music: from the African Gold Coast to Kendrick Lamar

Muddy Waters was a man of many names, each one expressing a different aspect of his life and character. "McKinley Morganfield", his birthname, tells the story of the wooden shack he was born in and lived in for two decades at the Stovall Plantation, where he grew up picking cotton. "Muddy Waters," the name his grandmother Della Grant bestowed upon him, tells the story of the young boy splashing around in Deer Creek near Rolling Fork, Mississippi. It would eventually become the stage name used at Chicago's hottest clubs like Silvio's and Club Zanzibar. "Mississippi" was the nickname used at times to remind audiences worldwide of his humble beginnings. My favorite, and author Sandra B. Tooze's favorite, is The Mojo Man, which she defines through her biographical work Muddy Waters: The Mojo Man. The "mojo" that Muddy Waters exhibited, and all great blues musicians had, was something more than a musical attribute. It was a characteristic trait that could only be found in those who personified the struggle of blacks in the American south, but who used their roots to persevere and rise up to change that narrative. The moods and themes of the struggle itself for blacks in the American south were used as the fuel to create music that would become the blues. This music was so relatable and understandable to the black population that it became a craze like no other. In this way, an extremely negative experience was turned around completely into a positive experience of

unfathomable proportions. The power of communicating and spreading the feelings of struggle to bring the black population in America together through entertainment and enjoyment is what mojo encapsulated, and this is what Tooze's main thesis unearths.

#175 - Sanders, Olivia

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Allison Jaeger Berena, Psychology
Co-Author(s): Zhaocheng Wu, Olivia Sanders, Jonathan Lamberth
Funding: NSF REU: NSF grant funding: #230099 | **Project Category:** Social Sciences

When familiarity fails: The impact of analogical examples on judgments of learning

Analogies can improve understanding of difficult science concepts by connecting unfamiliar, complex ideas to pre-existing frameworks (Gentner, 1983). However, some research has shown that the effectiveness of analogies can depend on how clearly they provide mappings between existing knowledge and to-be-learned information (Duit, 1991). The goal of this experiment was to examine how analogies in geoscience texts impacts comprehension and judgment accuracy when paired with different comprehension instructions. Approximately 500 students from a Survey of Earth Sciences Lab class (Fall 25/Spring 26) read three texts on geoscience topics: seafloor spreading and subduction, groundwater, and earthquakes. Using a 2 (Text: Analogy, No Analogy) x3 (Instruction: Basic, Test Expectancy, Test Expectancy + Drawing) between subjects design, students were randomly assigned to read texts with or without analogies and were randomly assigned to receive basic comprehension instructions, test expectancy instructions, or test expectancy and drawing instructions. After reading each text and completing a drawing of important ideas, students were prompted to judge how well they thought they would perform on a test of the material they just read. After reading and judging all three texts, students completed a set of multiple-choice comprehension tests, one for each topic. Several predictions for this study will be examined. First, it is predicted that the presence of analogies will not support improved comprehension but may harm the accuracy of students' judgments of learning. It is also predicted that students who receive a test expectancy instruction will make more accurate judgments of learning compared to those who only get basic comprehension instructions. These predictions are based on the idea that analogies can give students a false sense of fluency, impacting their judgment accuracy, and that knowing how they will be assessed helps students make more accurate judgments.

#176 - Savage, Amaya

Major: Psychology - Bachelor of Science
University: Mississippi School for Mathematics and Science (MSMS)
Faculty Research Mentor: Arazais Oliveros, Psychology
Co-Author(s): Kristina Schoenthaler, Kristina Schoenthaler, Arazais Oliveros
Funding: None | **Project Category:** Social Sciences

Growing Up Without a Parent: Implications for Parenting in the Next Generation

"Do as I say, not as I do" is a phrase commonly used by parents to discourage children from imitating behaviors they consider undesirable. However, developmental research suggests that children learn mostly through observational learning, acquiring behaviors, attitudes, and interpersonal patterns by watching and listening to the adults around them (Rymanowicz, 2021). Because parents often serve as primary role models, experiences within one's family of origin can play an important role in shaping how individuals later understand and enact parenting. For some individuals, however, childhood occurs in the absence of one or both parents due to circumstances such as separation, incarceration, death, or other disruptions to family structure. Although children often demonstrate resilience in response to these challenges, the absence of consistent parental role models may influence parenting behaviors and confidence develop in adulthood. Using the Panel Study of Income Dynamics (PSID), this study examines whether parental absence during childhood is associated with differences in parenting style and parental self-esteem in adulthood. It is hypothesized that individuals who grew up without one or both parents will report differences in parenting style and lower parental self-esteem compared to new parents raised in two-parent households. Understanding how childhood experiences - such as an absent parental figure to shape

learning - shape parenting in the next generation may help identify areas where additional support and resources could strengthen families and promote positive parenting practices.

#059 - Scaggs, Carter

Major: Data Science - Bachelor of Science
Faculty Research Mentor: Jonathan Barlow, Data Science
Co-Author(s): Kallen Zhou, Bella Garrard, Manning Littlejohn
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Engineering

Measuring AI Bias: A Review on LLM Sycophancy Studies

Sycophancy is a term for excessive flattery and is often used in relation to the language of artificially intelligent chatbots such as ChatGPT, Claude, and Google Gemini. These chatbots, also called Large Language Models (LLMs), tend to use sycophantic language in their responses. While it may seem like a polite feature, some studies have shown that sycophancy is an AI alignment issue that results in misleading outputs, excessive agreement, and reduced truthfulness. Current research is being done to explore sycophancy in quantifiable rates across varying models. As LLMs are increasingly used for financial, medical, and personal advice, understanding and regulating this behavior has become critical. The purpose of this project was to screen multiple studies related to AI sycophancy, filter the ones that are relevant, determine their definitions of sycophancy, and compare/contrast their methods for quantifying it. Following PRISMA-ScR guidelines, we searched arXiv, ACL Anthology, and Scopus for related AI research papers. Of the 254 papers found, only 26 studies met inclusion criteria. Our review process showed that most studies define sycophancy through a truth-alignment tradeoff (20 papers) and excessive agreement (18 papers), while fewer emphasize traditional flattery (4 papers). Operationally, researchers most commonly induce sycophancy through preference signaling and authority framing, suggesting the phenomenon is treated as socially mediated rather than purely factual error. Measurement approaches vary, with studies relying on accuracy-based, agreement-based, or consistency-based metrics, and only one-third proposing new benchmarks. Overall, our study concluded that while there has been an increase in the number of AI sycophancy papers published over the past few years, researchers have yet to agree on a consensus for observable symptoms. Measurement strategies for sycophancy also remain inconsistent. An increase in standardization for conceptual frameworks and benchmarking would help to support effective mitigation strategies in AI sycophancy research.

#177 - Sceroler, Anna

Major: Human Development & Family Sci - Bachelor of Science
Faculty Research Mentor: Minel Guler, School of Human Sciences
Co-Author(s): JuYoung Lee, Leslie Martinez, Eliza Foss, Gabrielle O'Quinn
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Social Sciences

How Parenting Styles Affect Self-Esteem and Clothing Confidence in Young Adulthood.

Parenting styles play a critical role in shaping children's psychological development, particularly in relation to self-esteem. Authoritarian parenting, high control and low emotional responsiveness, has been consistently associated with lower levels of self-esteem in children. While previous research has examined the relationship between parenting styles and self-esteem, as well as the influence of self-esteem on appearance-related behaviors, limited research has directly explored clothing confidence as a potential long-term outcome of authoritarian parenting. Clothing confidence, defined as an individual's comfort, assurance, and ability to express identity through clothing choices, is an important aspect of self-expression during young adulthood. Understanding how early parenting experiences may influence clothing-related confidence can provide insight into the broader psychological factors that shape personal identity and self-presentation. The objective of this study is to examine the relationship between authoritarian parenting and clothing confidence in young adulthood, 18-25y, and to investigate whether self-esteem mediates this relationship. The study proposes three hypotheses: (1) higher levels of authoritarian parenting will be associated with lower self-esteem, (2) lower self-esteem will be associated with reduced clothing confidence, and (3) self-esteem will mediate the relationship between authoritarian parenting and clothing confidence. This study will use a quantitative research design and collect data through an online survey administered via Qualtrics. Participants will consist of

young adults recruited through researcher outreach. The survey will measure authoritarian parenting using the Parenting Perception Scale (PPSS), along with established the Rosenberg scale, assessing self-esteem and the 22-item Clothing Style Confidence Scale developed by Nancy Joyner Armstrong. Descriptive statistics and correlational analyses will be used to examine relationships among the variables. This research aims to contribute to the literature by identifying clothing confidence as a potential long-term psychosocial outcome of authoritarian parenting and by highlighting the mediating role of self-esteem in this relationship.

#092 - Schloemer, Julia

Major: Music Education - Bachelor of Music Education
Faculty Research Mentor: Jessica Haislip, Department of Music
Funding: None | **Project Category:** Arts, Music, & Design

The Zurna: Its History, Significance, and the Piece it Inspired

Jacques Ibert (1890-1962) was a French composer during the Modern period. He is best known for his orchestral works, specifically *Divertissement* and *Escales*. Ibert wrote *Escales*, or "Stopovers," in 1922 as a three-movement series, each movement representing a stop he made in the Mediterranean. The second movement of the work, *Tunis-Nefta*, recalls his time in Tunisia. Ibert uses musical imagery to detail his journey in Tunis, the capital city of Tunisia, and Nefta, a desert town farther inland. The extensive oboe solo in *Tunis-Nefta* was inspired by a tune Ibert heard played on a double-reeded instrument in Nefta. This lecture analyzes the zurna, the instrument that probably played the tune Ibert heard. The zurna is a double-reeded instrument used in Tunisian folk music. It is similar to the oboe because of its conical bore, reed structure, and bright, clear sound. The zurna was born as the combination of many double-reeded instruments that had independently developed in different areas of the Muslim world. It spread to Europe and Asia with the spread of Islam and is a precursor to the shawm, a European instrument which is a direct ancestor of the modern oboe. Folk music featuring the zurna is played now in Tunisia, as well as areas of the Middle East, Central and West Asia, and parts of Europe. This information will be presented as a lecture-recital.

#178 - Seymour, Mason

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Mary Dozier, Psychology
Funding: None | **Project Category:** Social Sciences

The Association between Motivations for Competition and Self-Esteem

Objective: Mastery of a task or competitive domain is a common goal. However, motivations underlying competition may serve to undermine an individual's ability to succeed. The aim of this study is to determine if different motivations for competition are associated with changes in self-esteem following success or failure in a competition. **Methods:** Undergraduate students (N = 131) at a large southeastern university completed an online survey in exchange for course credit. **Results:** The average age was 19.47 (SD = 3.39) and the majority of the sample identified their gender as female/woman (n = 85; 65%) and their race as either Black/African American (n = 33; 25%) or White (n = 93; 71%). Participants reported significantly higher levels of self-esteem following positive results from a competition compared to negative results ($t(112) = 10.48$, $p < .0001$). General Competitiveness was positively correlated with general self-esteem ($r = .19$, $p = .03$); however, scores on self-esteem for negative results from a competition were negatively correlated with Competitiveness subscales of Affectivity ($r = -.34$, $p = .0001$) and Personal Enhancement ($r = -.22$, $p = .015$). Self-esteem following a positive result from a competition was unrelated to Competitiveness (all $ps > .05$). **Conclusions:** The reason for which a person competes may determine changes to their self-esteem following a negative or a positive outcome. Having one's sense of self linked with competition may have detrimental effects following failure. Future research should examine longitudinal changes in frequences of competition following outcomes of failure for individuals with higher levels of Affectivity or Personal Enhancement Competition types.

#122 - Shaw, Jakeria

Major: Business Economics - Bachelor of Business Adm
Faculty Research Mentor: Morgan Flow, History
Funding: None | **Project Category:** Humanities

Possible Solutions to The Gambia's Saltwater Encroachment Crisis: A Literature Review

Saltwater encroachment is a global crisis that mostly affects coastal areas. It stems from groundwater extraction and the effects of global warming, such as rising sea levels and decreasing aquifer recharge. Since saltwater intrusion is an effect that takes a while to appear, identifying the possible management strategies is essential to ensure economic and human health. Focusing on The Gambia, this issue is particularly severe. As their primary drinking source is ground water, food insecurity and economic poverty continue to increase at higher rates due to low crop production and high water scarcity. Previous studies have shown that hydraulic barriers, dams, and desalination are effective for combatting saltwater intrusion. In this literature review, the aim is to find the optimal solution tailored to Gambia's ongoing saltwater intrusion by synthesizing existing research that expresses saltwater encroachment mitigation and preventative measures, such as past successes, current practices, and surfacing methods. The findings provide a long-term implementation plan that promotes the revitalization of aquifers and reduces water scarcity.

#277 - Shelton, Isabella

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Florencia Meyer, Biochemistry Nutrition Health Promo
Co-Author(s): Federico Hoffman, Heather Jordan, Tanner Marlow, Sandra Benin
Funding: URSP, ORED Undergraduate Research Program | **Project Category:** Biological and Life Sciences

Characterization of Black Soldier Fly Virome in Health and Disease

Black Soldier Flies, *Hermetia illucens*, are widely farmed insects with important uses in waste management and animal feed production due to their ability to convert organic waste into protein. The demand for sustainable protein sources is increasing, making it important to understand the factors that can affect BSF colony growth. These insects are reared in trays or chambers that house thousands of individual larvae, allowing ideal conditions for the rapid spread of viruses. This poses a threat to colony production; however, the microbes associated with BSF remain widely understudied. For this project, four separate industries provided Black Soldier Fly larvae from both high and low productivity trays. Gut tissue was dissected, and the RNA was extracted to identify novel viruses associated with insect health and productivity. Cell culture experiments are being established using SF9, *Spodoptera frugiperda*, cells to assess whether viruses present in sick animals are infectious. Cultured cells' morphology will be monitored, and the expression of antimicrobial genes will be observed using PCR. Understanding the viruses associated with BSF larvae provides important insight into how viral pathogens can influence colony health and productivity. It will also give good insight and practices to improve the BSF farming industry.

#060 - Shelton, Jonathan

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Soroush Korivand, Mechanical Engineering
Funding: Bagley College of Engineering | **Project Category:** Engineering

Estimating Hand-Generated Force from Forearm EMG Signals Using Machine Learning

Electromyography (EMG) signals represent the electrical activity generated by muscles during contraction and provide a non-invasive method for observing neuromuscular activation. This research investigates whether EMG signals can be used to estimate the intensity of muscle activation and the resulting hand-generated force during specific gestures. Establishing a reliable relationship between EMG patterns and applied force could enable more intuitive control strategies for assistive technologies such as prosthetic hands, rehabilitation devices, and human–machine

interfaces. To capture muscle activity, eight Delsys surface EMG sensors are positioned on the forearm to record signals while a set of predefined hand gestures is performed. The recorded EMG signals are synchronized with gesture labels and processed using the open-source Python library libEMG. The processing pipeline includes filtering, smoothing, and extraction of relevant temporal and frequency-domain features that characterize muscle activation patterns. These features are used to train machine learning classifiers capable of identifying patterns associated with different gestures and levels of muscular effort. Once trained, the classifier is deployed in a real-time inference framework to recognize gestures from incoming EMG signals. To quantitatively evaluate the relationship between EMG activity and applied force, the gestures are performed while compressing calibrated mechanical springs. Because the spring constant and compression displacement are known, the applied force can be calculated using Hooke's Law. The predicted muscle activation derived from EMG signals is then compared with the measured spring force to evaluate the accuracy of EMG-based force estimation. By analyzing the relationship between EMG features, gesture recognition, and measured force output, this research aims to advance methods for estimating human-generated force from neuromuscular signals. The findings may contribute to improved control strategies for robotic prosthetics, rehabilitation systems, and other human–machine interaction technologies.

#061 - Sherwin, Marin

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Sungu Kim, Mechanical Engineering
Funding: None | **Project Category:** Engineering

Filter-Free Microfluidic Concentrator for High-Throughput Microplastic Detection

Microplastic pollution, consisting of plastic particles smaller than 5 mm, has emerged as a global environmental concern due to its persistence in marine ecosystems and its effects on the food chain. Traditional microplastic detection techniques, such as visual microscopy, Fourier-transform infrared (FTIR) or Raman spectroscopy are often limited by slow processing time, resolution, and upstream sample preparation that is labor and resource intensive. Therefore, there is an urgent need for next generation microplastic detection techniques that are rapid, high-throughput, high resolution, and resilient to complex environmental matrices. We propose a two-stage microfluidic microplastic detection method that is filter-free, rapid, and high-resolution. The proposed method consists of, first, concentrating particles from large-volume samples, and second, downstream plastic identification via impedance flow cytometry. In this study, we present the upstream particle concentration part. The upstream concentrator operates using inertial focusing. The proposed spiral channel introduces inertial lift and Dean drag forces that effectively concentrates particles near the inner wall of a spiral channel. The proposed spiral concentrator was fabricated by additive manufacturing, ensuring affordability and accessibility. The device was tested with polystyrene beads as microplastic proxies, introduced uniformly across the channel inlet and color-coded for size-specific fluorescence tracking. Particle migration to the inner wall was imaged via fluorescence microscopy. Performance was evaluated across Reynolds numbers by varying flow rates, quantifying enrichment ratios. These results are significant as the method eliminates filters, which is common in conventional approaches, avoiding clogging, chemical leaching, and disposal issues. Its inherent parallelizability (e.g., multi-spiral arrays) supports scalable throughput. Future work integrates downstream impedance flow cytometry for dielectric discrimination of plastics from organic debris, enabling end-to-end automated detection.

#278 - Simbeck, Patton

Major: Ag Eng Tech & Bus - Bachelor of Science
Faculty Research Mentor: Raju Bheemanahalli, Plant and Soil Sciences
Co-Author(s): Sujan Poudel, Lekshmy V. Sankarapillai
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Characterization of Soybean Roots and Nodulation Responses Under Drought

Soybean (Glycine max) is a vital legume crop, valued for its high protein and oil content. Roots serve as the plant's primary sensory organs, detecting stress signals and translocating them to above-ground parts to facilitate physiological adjustments crucial for stress tolerance. Unlike monocots, soybean root systems continue to grow

during reproductive stages. As a result, drought stress at these stages can significantly impair nutrient acquisition, water uptake, and biological nitrogen fixation, all of which are essential for maintaining plant health and achieving high yields. This study evaluated 14 different soybean genotypes under control (100% irrigation) and drought (40% irrigation) conditions. Below-ground traits were measured to assess how drought during the reproductive stage affects root system development and nitrogen-fixing capacity. Initial results showed that drought caused a 14% decrease in root length and a 33% decrease in root biomass; however, the root-to-shoot ratio remained stable under stress. In addition, nodules involved in biological nitrogen fixation declined by an average of 33%, indicating that drought stress reduces nodulation and overall nitrogen availability for plants. Variability among genotypes was evident, with some showing nodulation reductions as high as 61%, which may suggest different levels of drought sensitivity. The findings highlight the importance of root and nodule traits as key indicators for selecting soybean genotypes with varying drought tolerance. Our study advances understanding of the root and nodulation trade-off in response to drought stress during the reproductive period.

#062 - Simmons, Summer

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Tonya Stone, Mechanical Engineering
Co-Author(s): Luke Peterson
Funding: BRIDGES | **Project Category:** Engineering

Finite Element Analysis of an Ankle-Foot Orthotic Spring Under Dorsiflexion Loads

Movement disorders affect millions of people in the United States and globally and can lead to increased metabolic cost of walking, slower speeds, and secondary health issues like arthritis, inflammation, and joint pain. Ankle foot orthoses (AFOs) are often used to compensate for physical or neurological conditions affecting movement. Composite materials are commonly used in AFOs for their high strength to weight ratio and material stiffnesses that closely match human body structures. We examine a novel saddle spring shaped geometry inspired by the mantis shrimp forearm, which is known to store and convert tremendous elastic potential energy into kinetic energy, to serve as an alternative AFO spring to contemporary designs. We use a finite element analysis of an AFO under walking loads to determine the effect of composite material stiffness properties, composite ply orientation, and laminate thickness on saddle spring's strain energy storage characteristics.

#063 - Simon, Callie

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Christopher Hudson, Computer Science and Engineering
Co-Author(s): Daniel Carruth, Emma Hartley, Marcus McGee
Funding: BCoE Undergraduate Research Award | **Project Category:** Engineering

A Real-Time, Markerless Computer Vision Pipeline for Lameness Detection in Dairy Cattle

Lameness in dairy cattle remains one of the three major health risks in the industry, yet efficient and reliable monitoring has remained a challenge. Traditional methods of detecting lameness are often inefficient, costly, and inconsistent, leading to delayed intervention (Van Nuffel et al., 2015). In addition, traditional methods can put cattle under stress, leading them to mask their signs of sickness due to their nature as a prey species (Van Nuffel et al., 2015). In recent years, there have been significant advancements in markerless pose estimation for quadrupeds, including open-source tools such as DeepLabCut (DLC) and SuperAnimal-Quadruped (SAQ). In this work, we present a real-time AI system integrating detection, identification markerless pose estimation, and kinematic feature extraction to aid in lameness detection within a free stall environment. The first step in our pipeline is a cattle identification model built on YOLOv5 leveraging transfer learning from labeled frames (Clayton, 2024). Identified cattle with a confidence score of 0.90 are bounded and cropped to pass to our keypoint extraction model. SuperAnimal-Quadruped leveraging transfer-learning is used to identify and track anatomical keypoints of individual cattle across multi-view video data in the free stall. Across multiple cattle we focus on keypoints such as the head, points along the spine, hooks, and pins, with these tracked keypoints we compute 2D joint and postural angles allowing for quantitative analysis and classification of lameness. This pipeline produces a non-invasive approach and a per animal

estimate of kinematics data to be leveraged for lameness detection. Using this approach, we can improve rapid lameness detection and allow early intervention.

#064 - Singh, Adi

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Mojtaba Parsaee, School of Architecture
Funding: None | **Project Category:** Engineering

AI-Powered Platform for Assessing Environmental Life-Cycle Impacts of Disaster Debris

Natural disasters generate massive quantities of building debris, creating significant environmental challenges in waste management and material recovery. Accurately assessing the environmental life-cycle impacts of this debris — including greenhouse gas emissions, energy consumption, and material recovery potential — is a critical yet labor-intensive process that has traditionally relied on manual calculations across large datasets. This research presents the development of an AI-powered platform designed to automate and streamline this assessment process.

The platform integrates building material data from life-cycle assessment tools with scenario-based end-of-life assumptions to automatically calculate mass quantities, global warming potential, and energy demand for disaster-generated debris across multiple recovery scenarios. Three end-of-life scenarios are modeled: complete landfilling, combined landfilling and recycling, and a comprehensive recovery approach incorporating landfilling, recycling, and material reuse. For each scenario, the platform reads material-specific assumptions and applies them systematically across all building archetypes, eliminating the need for repetitive manual computation. The automation layer is built using Python-based data processing pipelines that extract and process raw material data, apply environmental coefficients, and generate structured analytical outputs. Future development will incorporate large language model integration, enabling the platform to interpret building data, generate scenario recommendations, and produce environmental impact reports autonomously. This AI-driven approach is intended to reduce assessment time significantly, minimize human error, and scale the analysis to entire communities of buildings rather than individual structures. This research contributes to the growing intersection of artificial intelligence and sustainable disaster recovery planning, providing researchers and practitioners with a scalable tool for evidence-based decision making in post-disaster debris management and environmental impact mitigation.

#179 - Singh, Adi

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Megan Richardson, Social Science Research
Funding: SSRC | **Project Category:** Social Sciences

Automated Content Analysis of Extremist Discourse: Advancing Computational Social Science Methods for Hate Speech Detection and Violence Prevention

Purpose: This research addresses critical methodological challenges in studying online extremist discourse by developing machine learning frameworks that accelerate large-scale content analysis while maintaining analytical rigor. As digital hate speech increasingly correlates with offline violence, scalable detection methods are essential for both academic research and public safety applications. **Theoretical Framework:** Drawing on social identity theory and intergroup threat frameworks, this study examines how extremist communities construct in-group solidarity and out-group derogation through linguistic patterns, conspiracy narratives, and dehumanizing rhetoric. We integrate computational linguistics with established violence prediction models to identify actionable threat indicators.
Methodology: We developed automated coding algorithms using natural language processing and pattern recognition techniques to detect extremist terminology, conspiracy theories, and threat construction patterns in social media data. The system employs supervised machine learning to classify sentiment, identify outgroup targeting, and measure dehumanizing language—tasks traditionally requiring extensive manual coding by trained researchers.
Innovation: This hybrid human-AI methodology reduces analytical bottlenecks that limit real-time threat assessment while preserving the nuanced interpretation essential to social science research. Automated preprocessing enables researchers to focus on complex theoretical analysis rather than time-intensive data categorization.

Implications: Beyond methodological advancement, this research contributes to violence prevention by enabling rapid identification of escalating extremist rhetoric and vulnerable population targeting. The scalable framework supports evidence-based policy interventions and community protection strategies, while democratizing advanced analytical capabilities for under-resourced research institutions and advocacy organizations.
Significance: By bridging computational methods with critical social theory, this work demonstrates how artificial intelligence can amplify rather than replace human expertise in understanding and preventing hate-motivated violence.

#065 - Sisco, Andrew

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Carver Middleton, Athlete Engineering Institute
Co-Author(s): Jim Weinstein, Cooper McNeel, Carver Middleton, Jim Weinstein
Funding: SMART Act | **Project Category:** Engineering

A Novel Design and Manufacturing Method of a Weight Collar for the Tsunami Bar®

This project outlines a novel advancement of a barbell weight collar through the use of additive manufacturing methods to prototype an updated design, establish a scalable manufacturing pathway, and pursue a licensing agreement with existing industry partners, Williams Strength and Tsunami Bar Sports. The companies have defined specifications for their weight collar for one of their flagship product the Tsunami Bar®, a flexible barbell used in strength and conditioning environments. Traditional weight collars available on the market cannot meet the specifications for this application, as the required collar design must incorporate a safety pin that runs through the barbell to prevent the weight from sliding off the end of the bar. Initial development utilized additive manufacturing, specifically Selective Laser Sintering (SLS) with PA-12 material, to rapidly prototype and refine the weight collar design. Using a print-in-place approach, we have developed a design that is fully assembled and functional upon print completion. Through iterative CAD modeling and functional testing in operational environments, a fully SLS-printed prototype has been produced as proof of concept, achieving near-TRL 7 validation. The design improves user ergonomics, reduces manual assembly requirements, and meets the structural demands associated with athletic loading conditions. With a validated SLS prototype established, the project is now progressing toward commercialization. The current SLS configuration is being evaluated for near-term production and licensing potential. In parallel, research is underway to explore alternative manufacturing approaches—such as CNC machining and injection molding—to support scalability for commercialization, reducing per-unit cost while maintaining mechanical performance and safety compliance. Design adjustments required for assembly-based manufacturing and high-volume production are being analyzed alongside material and supply chain considerations. This work demonstrates how additive manufacturing can accelerate product development while enabling a strategic pathway from functional prototype to scalable, licensable product in collaboration with industry partners.

#279 - Skelton, Chloe

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Xue Zhang, Animal & Dairy Science
Co-Author(s): Christy Bratcher, Jocelyn Bodmer
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Comparative Flavor Chemistry of Rabbit and Chicken Meat

The rabbit production industry represents a promising yet underutilized segment of meat agriculture. Rabbits offer several notable production advantages, including high feed-to-protein conversion efficiency, rapid reproductive rates, and low environmental impact due to minimal space and resource requirements. From a nutritional standpoint, rabbit meat is a lean, high-quality white meat with low fat content and high protein and micronutrient density. Despite these advantages, consumer perception remains a major barrier. Many Americans view rabbits primarily as companion animals, which contributes to low consumption, only about 30 million pounds of rabbit meat are consumed annually in the United States, compared to 30 billion pounds of chicken. This research aims to address these perception challenges by examining the flavor characteristics and potential health benefits of rabbit meat. Using Solid Phase

Microextraction (SPME) combined with Gas Chromatography–Mass Spectrometry (GC-MS), we analyzed volatile organic compounds (VOCs) in fresh and 5-day refrigerated rabbit and chicken samples. Chicken was selected as a control species due to its similar overall composition, aside from differences in fat content. To ensure anatomical comparability, samples included rabbit belly and hind leg alongside chicken breast and thigh. The VOC profiles revealed that fresh rabbit and chicken samples share remarkably similar chromatographic patterns. Key volatile compounds detected in both species included hexanal, heptanal, nonanal, 1-octen-3-ol, octanal, pentanal, and 2-pentylfuran. These similarities indicate that consumers can anticipate a flavor experience comparable to chicken when eating rabbit meat. By demonstrating rabbit meat's favorable flavor profile, nutritional advantages, and environmental benefits, this work supports efforts to improve consumer acceptance and provides valuable insights for producers, processors, and extension educators seeking to expand the rabbit meat market.

#084 - Slade, Gabriel

Major: Geoscience - Bachelor of Science
Faculty Research Mentor: Jake Reed, Geosciences
Funding: None | **Project Category:** Physical Sciences

How Possible Is It? Investigating Influences that Affected the Issuance of Tornado Possible Tags in Severe Thunderstorm Warnings on April 18th, 2019

Severe Thunderstorm Warnings sometimes include "Tornado Possible" (Tor) tags to indicate the potential for tornado development, but forecaster is not sufficient to issue a tornado warning. However, the factors influencing the issuance of these tags remain poorly understood. This study examines April 18th, 2019, a severe weather event that was part of system that produced several days of severe weather from the Southern Plains to the East Coast to investigate how radar coverage, storm-scale velocity data, and warning polygon size affected the issuance of Tor tags. Using a combination of radar observations, interviews with National Weather Service forecasters, quantitative data analysis of severe weather data, and statistical visualization techniques, this investigation aims to develop better understanding of radar coverage, storm-scale velocity data, and warning polygon size affect the issuance of Tor tags in Severe Thunderstorm Warnings.

#280 - Small, Wilson

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Peixin Fan, Animal & Dairy Science
Co-Author(s): Michelle Martinez, Jalyn Hawkins, Isaac Jumper, Kelsey Harvey, Angelica Ruiz
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Associations Between Social Behavior and Production in Lactating Holstein and Jersey Cows

Regrouping is a common management practice in dairy production systems, which can negatively affect behavior, feed intake, and milk production. However, there is limited research on how social behaviors post-regrouping differs between breeds and how these behaviors are associated with production parameters. Twenty-four lactating dairy cows (12 Holstein, 12 Jersey), previously housed in three mixed-breed pens, were regrouped by breed and housed in two pens for 30 d. Social behavior, including agonistic and affiliative interactions, was video-recorded for 3 wk (12 h/d, 4 d/wk). Rumen fluid was collected on d 0 and 30 for VFA analysis and pH measurement, and milk samples collected on the same days were analyzed for composition. Milk yield was recorded daily. Spearman correlations assessed relationships among host, behavioral, ruminal, and production data. Total affiliative behaviors performed tended to be negatively associated with milk yield (wk 3) in both breeds, while total affiliative behaviors received was negatively associated with milk yield in Holsteins (wk 2 and 3) and positively associated with milk lactose in Jerseys (d 30). Affiliative behaviors performed and received were also positively associated with ruminal isovalerate concentrations in Holsteins (d 0), whereas affiliative behaviors performed in Jerseys were associated with higher ruminal acetate concentrations and pH (d 0 and 30). Host factors, such as age, parity, and weight, were associated with agnostic behaviors, but were not associated with total affiliative behaviors performed, milk yield, milk lactose, or rumen isovalerate, acetate, and pH. Overall, the levels of social engagement appear to differ between Holstein and Jersey cows in their associations with production. The relationships observed between affiliative interactions, milk

production, and rumen parameters suggest potential influences on metabolic efficiency via the gut-brain axis, though a larger sample size is needed to confirm these findings.

#180 - Smallen, Ryland

Major: Ag Educ., Leadership & Comm - Bachelor of Science
Faculty Research Mentor: Jessica Benson, School of Human Sciences
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Social Sciences

AgAware: Growing Student Insight on Agricultural Policy and Leadership

This ongoing research project examines students' perspectives on agricultural policy and the factors shaping their understanding of it. The study uses a pre-assessment, several instructional activities, and a planned post-assessment to explore how students interpret agricultural policy and the influences that contribute to their knowledge.
Preliminary data from 40 university students reveal a notable educational gap. Although 58 percent report personal involvement in agriculture through work or farming, 51 percent have received no formal instruction related to agricultural policy or policy-related decision-making processes. As a result, 46 percent describe their knowledge as "very limited," and 38 percent report feeling "not at all confident" in explaining policy topics to others.
Students report relying primarily on family backgrounds and social media platforms such as Facebook and TikTok for information. Many identify technical terminology, unfamiliar processes, and complex language as significant barriers to understanding agricultural policy. The post-assessment will explore how various instructional components influence student comprehension and confidence. These components include social media posts on contemporary agricultural issues, teaching methods used during instruction, learning tools such as podcasts, and opportunities to engage in dialogue about policy topics. Despite low initial self-efficacy, students expressed a strong desire to communicate about challenging issues and emphasized the importance of clear, well-informed dialogue within the agricultural sector. Upon completion, the study will provide insights into how students view agricultural policy and which factors most strongly influence their understanding. These findings will also inform approaches for cultivating future change leaders who can thoughtfully navigate policy discussions and contribute to informed decision-making within the agricultural industry.

#281 - Smith, Carson

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Melanie Boudreau, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Eric Michel
Funding: College of Forest Resources URSP | **Project Category:** Biological and Life Sciences

Beyond cellular tracking: refining GSM technology for use on young deer

Global positioning system (GPS) technology is a common and effective way of tracking animals in natural landscapes. The current technology used to track white-tailed deer fawns is expandable GPS collars, the attachment method of which has been shown to increase mortality. We deployed new GPS and Cellular ear tags on adult bucks at the captive deer research facility at Mississippi State University to assess the performance, accuracy and feasibility of using this technology on a variety of ages and sexes in other populations. We conducted observations during programmed location fix times and we collected location of the animal, behavior (laying down, standing up, browsing, etc.), and whether the animal was in cover. We also recorded a short video of the deer during the observation to ensure accuracy of collected data. We discuss unit accuracy and performance in context of our observations.

#282 - Sneed, Emmalee

Major: Microbiology - Bachelor of Science
Faculty Research Mentor: Ling Li, Biological Sciences
Funding: None | **Project Category:** Biological and Life Sciences

At2GMG1 Enhances Photosynthetic Capacity and Promotes Growth While Reducing Starch Accumulation in *Arabidopsis thaliana*

Efficient carbon metabolism is essential for plant growth, development, and productivity. The coordination between photosynthetic carbon assimilation and carbohydrate storage plays a central role in determining biomass accumulation and yield. *At2GMG1* is a previously uncharacterized gene in *Arabidopsis thaliana*, and its role in regulating plant metabolism is not yet understood. To investigate its function, we generated *At2GMG1* overexpression (OE) lines, *At2GMG1* OE4 and *At2GMG1* OE7, and compared them with wild-type (Col-0) plants. Overexpression was confirmed by RT-qPCR. We then performed physiological, biochemical and morphological analyses, including chlorophyll quantification, starch staining, and measurement of plant growth. The overexpression lines showed higher levels of chlorophyll a and chlorophyll b than wild type, suggesting enhanced photosynthetic capacity. In contrast, starch staining revealed reduced starch accumulation in OE plants relative to Col-0, indicating altered carbon allocation. Phenotypic analysis further demonstrated increased growth and biomass in the *At2GMG1* overexpression lines. Together, these results indicate that *At2GMG1* positively regulates photosynthetic performance and promotes vegetative growth while shifting carbon allocation away from starch storage. These findings suggest that *At2GMG1* may be a promising molecular target for improving biomass production and crop productivity.

#181 - Snodgrass, Emily

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Jada Chubb, College of Ag & Life Sciences
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Social Sciences

From Awareness to Action: Understanding Perspectives on Sustainability Across MSU Academic Colleges

Today's students are showing increased levels of interest in sustainability, along with a concern for the current environmental state of the world. With greater value placed on environmental health comes a greater responsibility for higher education institutions to implement solutions and learning opportunities pertaining to sustainability into their programs and curricula. Previous research on this topic focuses on students who have prior connections to environmental or sustainability-based learning or students at larger, northern universities. This study aims to explore the perceptions related to campus sustainability of undergraduate students from a diverse collection of academic colleges at Mississippi State University. This has been done through the conduction of focus group interviews consisting of 2-3 people, where several questions/discussion points surrounding students' personal lives, perceptions, action, and awareness were brought up. Using both an inductive and deductive (using a common sustainability framework focused on Whole Institution Approaches) analysis, insight was gained into the level of awareness students have of sustainability and the value that they place on it. Initial findings show that students generally have an interest in the concept of sustainability, but they are limited by factors such as convenience and accessibility, along with a lack of awareness and education. By understanding gaps in knowledge and awareness of sustainability across campus, opportunities can be created for change in the impact that department heads, administrators, the Office of Sustainability, and more MSU-affiliated groups can make in this field. This will make possible the expansion of the existing scholarship, programs, initiatives, and more pertaining to environmental stewardship within higher education institutions.

#283 - Spinks, Emma

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Shien Lu, Agricultural Science & Plant Protec
Co-Author(s): Lindsey Robinson
Funding: The Mississippi Soybean Promotion Board | **Project Category:** Biological and Life Sciences

Characterization of *Aspergillus sp.* OTS1 Isolated from the Soybean Rhizosphere as a Potential Biopesticide Agent

Soybean is an essential, high-value crop in Mississippi, and disease pressure remains a major constraint to production. With the increasing incidence of chemical resistance in field populations of plant pathogens, there is a critical need to identify and develop effective biopesticide agents. In this study, healthy soybean roots were collected from disease

patches affected by charcoal rot caused by *Macrophomina phaseolina* to isolate potential antagonistic microorganisms. A fungal isolate designated OTS1 exhibited strong antibacterial activity against the fire blight pathogen *Erwinia amylovora* in plate bioassays. The peak inhibitory activity against *E. amylovora* was observed after three days of growth. Morphological characterization on potato dextrose agar revealed *Aspergillus*-type conidia and conidiophores. Internal transcribed spacer DNA sequencing analysis indicated that the isolate belongs to the genus *Aspergillus*, sharing 98.65% sequence identity with that of *Aspergillus heldtiae* PPRI 4229. Ongoing studies aim to further clarify its taxonomic identity and comprehensively evaluate its antimicrobial spectrum and biocontrol potential. This study provides foundational insights into the development of novel biopesticides for sustainable plant disease management.

#123 - Spitzer, Samuel

Major: Accounting - Bachelor of Accountancy
Faculty Research Mentor: Matt Peaple, Shackouls Honors College
Co-Author(s): Stephen Brain
Funding: None | **Project Category:** Humanities

Fair and Balanced, Question More: A Comparative Analysis of Fox News and RT

My research aims to conduct a comparative analysis of two different news networks: Fox News and RT, formerly Russia Today. Both networks were founded for the express purpose of disseminating news through a particular perspective -- in Fox's case, that of conservative America, and in RT's, that of the Russian state. However, at the same time, both networks also claim to be agents of truth that lend coverage to stories ignored by mainstream sources. The ultimate goal of my research is to examine two specific news cycles and show how they demonstrate that these two networks are similar on a structural and technical level despite serving very different audiences. Both networks create content that rejects an objective interpretation of events and exploits emotion and impulse in its reporting, thus furthering the idea of a "post-truth" world in which there is no such thing as true objectivity, only a range of competing perspectives.

#284 - Squires, Emma

Major: Forestry - Bachelor of Science
Faculty Research Mentor: Ashley Schulz, FWRC - Forestry
Co-Author(s): Eric Bridges
Funding: ORED Undergraduate Research Program | **Project Category:** Biological and Life Sciences

Overton Park inventory and seedling survival assessment to understand desired regeneration patterns

White oak (Quercus alba L.) and many other hardwood species dominate the overstory of the Overton Park Forest in Memphis, Tennessee, creating a thriving forest community that supports urban wildlife habitat and human recreation. Though white oak and other oak species dominate the overstory, understory inventories of Overton Park Forest have revealed very low rates of oak seedling establishment and recruitment. While no study has identified the cause of these low oak establishment and recruitment rates, it is hypothesized that these impacts to oak regeneration may be due to urban pollutants, wildlife browse on acorns and seedlings, human destruction of habitat or, most likely, light and competition levels. In this study, we aimed to assess the combined impacts of light and competition on oak seedling growth in the Overton Park Forest. Light and competition variables were manipulated to create four growing environments (i.e., treatments): (a) open canopy with cleared vegetation, (b) open canopy without cleared vegetation, (c) forested canopy with cleared vegetation, and (d) forested canopy without cleared vegetation. Each of the four treatments had 25 white oak saplings established in each plot in May of 2026. Seedlings were monitored by height, diameter, overall health/survival, and immediate vegetation competition levels were measured at the beginning, middle, and end of the growing season. Preliminary results demonstrate that seedlings survived and grew the best in the treatments with forested canopy without cleared vegetation, which indicate that light and competition levels may be impacting seedling establishment and recruitment. Future research should continue to monitor the seedlings to gauge long-term survival and growth rates of the trees. Ultimately, the results of this study can be used to inform management of urban forest areas aiming to re-establish weakening understory oak populations.

#066 - Stafford, Ryan Cole

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Sungu Kim, Mechanical Engineering
Funding: Directed Individual Study (DIS) | **Project Category:** Engineering

Bayesian Optimized Microfluidic Impedance Flow Cytometry

Fluorescence-Activated Cell Sorting (FACS) is the gold standard for high-throughput single-cell characterization, enabling precise multi-parametric analysis of biological populations. Despite its power, FACS is often limited by its reliance on expensive fluorescent labels, complex optical hardware, and the need for highly trained personnel. Impedance Flow Cytometry (IFC) has emerged as a compelling label-free alternative, providing a miniaturized and cost-effective platform for electrical single-cell analysis. However, because IFC relies on detecting minute fluctuations in electrical signals as cells pass through a microchannel, maximizing the signal-to-noise ratio through design optimization is critical. Currently, a universal design rule for IFC optimization remains elusive due to the complex interplay of electrode geometry and channel dimensions. While COMSOL Multiphysics simulations provide detailed insights into electric field distributions, performing a traditional parametric sweep across multiple dimensions is a computationally exorbitant and lengthy process. In this work, we implement a data-driven optimization framework using Bayesian Optimization (BO) to ensure rapid convergence toward optimal designs. Our methodology employs an iterative loop: the BO algorithm intelligently selects the most promising geometric parameters based on an acquisition function, COMSOL evaluates the impedance response for that specific configuration, and the resulting data is used to update a probabilistic surrogate model. This study represents the first application of BO to IFC design. The achieved improvements in device sensitivity will significantly contribute to establishing IFC as a robust, high-performance alternative to traditional FACS.

#285 - Stanley, J. Lake

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Kelsey Harvey, Prairie Research Unit
Co-Author(s): Kelsey Harvey, Madeline McKnight, W. Isaac Jumper, Brooklyn Laubinger
Funding: None | **Project Category:** Biological and Life Sciences

Impact of trace mineral source and ionophore inclusion on growth performance of beef steers during a 56-day preconditioning period

Weaning is one of the most stressful events in the beef production cycle, after which feed intake is often inadequate. Targeted nutritional strategies which improve animal performance during this period are warranted. The objective of this research is to evaluate the independent and interactive effects of monensin supplementation and trace mineral source during the preconditioning phase on growth performance of beef steers. This study utilized 64 steers which were ranked by body weight (BW) and randomly assigned to 1 of 4 groups, which were housed in drylot pens equipped with Vytelle Sense individual feed intake monitoring software. Subsequently, pens were assigned to receive 1 of 2 mineral (MIN) supplements: organic (OTM) or inorganic (INR) sources, and ionophores (MON; monensin at 200 mg/steer/day) or not (CON) in a 2x2 factorial arrangement. Individual feed intake was recorded daily, and steer BW was recorded at regular intervals throughout the study. No MONxMIN treatment effects were detected ($P \geq 0.48$) for steer initial or initial or final BW. However, a tendency for a MONxMIN effect was detected ($P=0.06$) for ADG given that steers consuming INR+MON tended to have increased ADG compared to OTM+MON ($P=0.06$) calves but tended to have decreased ADG compared to INR+CON ($P=0.06$) calves. A tendency for a MONxMIN effect was detected ($P=0.09$) for total dry matter intake, which was less ($P \leq 0.02$) for INR+MON steers compared to INR+CON and OTM+CON, and tended ($P=0.09$) to be less compared to OTM+MON steers. A tendency for a MON effect was detected ($P=0.10$) for feed efficiency, which tended to be greater for CON vs. MON steers ($P=0.10$). These findings

indicate that monensin supplementation during preconditioning may depress intake and growth in newly weaned calves, with evidence of interaction with trace mineral source.

#286 - Stoner, Rachel

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Federico Hoffmann, Biochemistry Nutrition Health Promo
Co-Author(s): Hunter Walt, Jose Ramirez
Funding: Shackouls Honors College Research Fellowship, URSP | **Project Category:** Biological and Life Sciences

Detection of Novel Bumblebee Viruses using Phylogenetics
Bumblebees (genus Bombus) are critical pollinators in many North American ecosystems. Unfortunately, the populations of multiple North American bumblebee species are declining due to the combined effects of habitat loss, climate change, and disease. This project combines RNA sequencing with the use of bioinformatics and phylogenetic analyses to detect known and novel viruses, analyze the expression of viral genomes, and estimate patterns of viral diversity and abundance. We performed analyses using 29 samples collected from bumblebees across six locations and eight species in North America. We identified 16 novel bumblebee viruses by comparing our sequences to those in the NCBI database and evaluating the percent identity between the aligned sequences. Then, we built phylogenetic trees to determine how the novel viruses relate to known viruses. We determined that our novel viruses come from a variety of taxa including Iflaviridae, Solinviviridae, and Picornaviridae. Many of them are closely related to viruses that infect other insect hosts, including honeybees (genus Apis). For example, we discovered a novel Lake Sinai virus which is a species that typically infects Apis mellifera. This indicates that there may be cross-species transmission of the novel viruses we found in this project.

#113 - Stringer, Everett

Major: Kinesiology - Bachelor of Science
Faculty Research Mentor: John Lamberth, Department of Kinesiology
Co-Author(s): Po-Lin Chen, Po-Lin Chen, Maxwell Torrey, John G. Lamberth
Funding: None | **Project Category:** Education

Relationship Between Hip Internal Rotation on Club Head Speed in Recreational Golfers
Introduction: The golf swing is a very complex, multi-segmented movement that relies on lower body force generation. Hip rotation contributes to force generation and transfer, influencing club head speed. Previous biomechanical research has examined the golf swing, primarily in relation to lower back injury and prevention. Efficient kinetic sequencing during the golf swing may enhance performance. The pelvis is considered to be the primary power generator in the swing. Club head speed and ball speed are commonly used in performance metrics to quantify output. **Purpose:** The purpose of this study is to examine the relationship between hip internal rotation and club head speed and ball speed in recreational adult golfers. **Methods:** Adult participants (≥ 18 years) with at least one year of golfing experience and who play a minimum of twice per month will be recruited. Peak trail hip internal rotation during the downswing phase will be measured using a markerless motion capture system. Club head speed and ball speed will be measured using a Foresight Sports GC2 launch monitor while driving swings into a simulator. Following 5-10 submaximal warm-up swings, participants will perform five maximal-effort driver swings, with one minute of rest between attempts. Mean peak trail hip internal rotation, club head speed, and ball speed across the five recorded swings will be calculated. Separate Pearson correlation coefficients will examine the relationships between trail hip internal rotation and club head speed and ball speed. Statistical significance will be set at $p \leq 0.05$. **Anticipated Results:** We anticipate a positive relationship between hip internal rotation and golf swing performance metrics. Findings may further clarify the role of hip rotational mechanics in a golf swing.

#103 - Sullivan, Taylor

Major: Marketing - Bachelor of Business Adm
Faculty Research Mentor: Mike Breazeale, Marketing/Quant Analysis/Bus Law
Funding: None | **Project Category:** Business and Economics

Seeing Packaging Differently: How Autistic Traits Influence Responses to Visual Complexity
This research examines whether autistic traits influence consumer preferences for simple versus visually complex product packaging. Rather than focusing on diagnosed autism, this study treats autistic traits as a spectrum that exists across the general population. By examining how individuals with varying levels of these traits perceive and choose between simple and complex packaging designs, the research explores how neurodiversity may shape responses to visual marketing. Data was collected through an online survey of approximately 260 respondents. Participants completed the *Autism Spectrum Quotient short form (AQ-10)* to measure autistic traits and the *Need for Precision (NFP) scale* to measure preference for precise and structured information. Respondents were then shown three sets of product packaging that varied in visual complexity and asked to rate their perceived complexity and product preference. A follow-up study will use eye tracking technology to examine where participants direct their attention when evaluating packaging with different levels of visual complexity. This will measure how attention is distributed across packaging elements, including brand claims and design features, to better understand how visual attention relates to consumer choice. The findings may provide insight into how individual differences influence responses to packaging design and may help marketers create packaging that communicates more effectively across diverse consumers.

#182 - Sutherland, Gabriella

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Jarrod Moss, Psychology
Co-Author(s): Xinyu Xie
Funding: None | **Project Category:** Social Sciences

Examining Perceptual Category Structure Through Similarity Judgments of Abstract Shapes
Strategy switching involves the process of shifting attention between different tasks or mental sets. However, individuals may organize visual stimuli differently, which could influence how easily these strategy shifts occur. In particular, the degree to which stimuli form clearly separated or overlapping perceptual categories may shape the likelihood of interference during strategy switching. The present study examines the perceptual similarity structure of abstract shape stimuli used in an ongoing investigation of strategy switching. Participants (N = 18) completed 500 pairwise similarity judgements among stimuli drawn from three predefined structural families. These judgments provide a measure of how participants determine pairwise similarity. Planned analyses evaluate similarity ratings across within-family comparisons (similar/similar) and between-family comparisons (similar/dissimilar) to assess the extent to which the stimulus families form distinct perceptual categories. In addition, variability in similarity judgements across participants, will be examined to explore potential differences in how individuals perceive these categories. This work aims to help determine whether the predefined stimulus families are actually perceived as distinct, and through that, understand if the structure of the stimuli provides context for how similarity between stimuli influences how easily people can switch between different strategies in cognitive tasks.

#093 - Sutherland, Gabriella

Major: Interior Design - Bachelor of Science
Faculty Research Mentor: Lyndsey Miller, Interior Design
Funding: None | **Project Category:** Arts, Music, & Design

Superminds Solidified: A Community Apothecary Project to Address Collective Health Intelligence in Mississippi
The Interior Design Educators Council (IDEC) introduced its annual student design competition, using Thomas Malone's "Superminds" and collective intelligence as conceptual drivers for a new, innovative educational landscape that reimagines the future of teaching and learning. Malone's "Superminds" sets a framework that emphasizes and

encourages human-computer interactions with the physical environment to promote problem solving, revolution, and action. In response to Mississippi's ongoing public health challenges and its connection to agricultural and herbal traditions, this project proposes a community apothecary that serves as a hybrid indoor-outdoor learning environment, dedicated to promoting adult well-being education through the integration of medicine, pharmacy, and traditional Southern herbal medicine. The current project also investigates how spatial design can transform education from a hierarchical, expert-driven model into a participatory, community-centered process. The design suggests a medicinal garden, shaded communal gathering spaces, and a flexible apothecary lab and modular classroom that together function as a shared learning system. These spaces are designed to support informal knowledge exchange between healthcare professionals, elders, adult learners, and digital tools that guide safe herbal use, contraindications, and wellness practices related to digestion, immunity, and stress regulation. By combining precedent analysis, research on adult learning environments, biophilic and participatory design strategies, and spatial programming informed by the theory of collective intelligence, this project demonstrates that community-based environments can act as "superminds" when spatial organization, technology, and cultural knowledge are intentionally aligned to foster cross-generational learning.

#094 - Swanson, Dan

Major: Communication - Bachelor of Arts
Faculty Research Mentor: Andrea Spain, English
Funding: None | **Project Category:** Arts, Music, & Design

Life, Reframed: How *Man with a Movie Camera* Crafts Reality from the Cutting Room Floor

Soviet filmmaker Dziga Vertov's defining 1929 work *Man with a Movie Camera* is considered in modern times to be one of the most important and influential films produced during its period, and has attained that status without the use of a plot, characters, or any sort of intertwining dialogue. Rather, it is his use of the "cut," or the edit between shots that creates meaning shared by both through juxtaposition, that molds a living, vibrant world out of a plain melange of *verité* footage, interpreting it through editorial choices in a manner that magnifies the confusion, heartbreak, joy, exhaustion, and beauty of sheer life that flows through any given city in a single day to an extent where the viewer, long desensitized to it from experience, can properly perceive it. He captures the raw emotion of unscripted, everyday life, from all walks of life, and presents it in a manner through the cut that literally forces his captive audience to look at what cannot normally perceived in a state of normalcy from the impartial perspective of the camera, all under the purposeful, guiding thumb of the editor. The revolutionary cutting techniques in Vertov's Man with a Movie Camera allow the film to take the reality captured on its celluloid and construct an enhanced vision of reality that has defined and solidified its place in cinematic history.

#183 - Sweeney, Abbey

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Jarrod Moss, Psychology
Co-Author(s): Emily Creel, Hannah Gjerde
Funding: None | **Project Category:** Social Sciences

Frustration as a Means for Creative Problem-Solving?

When may frustration be helpful in solving problems? Researchers have historically identified negative emotions as a hindrance to mathematical problem-solving, and frustration is often identified as a precursor to giving up. However, little attention has been paid to the role of frustration in solving ambiguous problems, which often require creative problem-solving processes. Insightful problem-solving—a type of creative problem-solving characterized by the solver needing to reorganize their understanding of the problem after getting stuck—are designed by researchers to be ambiguous. Solvers often become frustrated when stuck in these problems. While this frustration can prevent people from overcoming an inaccurate problem representation, actions taken when frustrated may sometimes lead to the discovery of novel solution strategies. The purpose of this study is to explore the relationship between frustration, quantified by the frequency of a solver's clicks while solving the Nine Dot and Cheap Necklace problems, and overall performance in these ambiguous problems.

#067 - Tankersley, Lonnie

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Vilas Shinde, Aerospace Engineering
Co-Author(s): Kurt Polzin
Funding: Bagley College of Engineering Undergraduate Research Award | **Project Category:** Engineering

Development of an Interactive, High-Fidelity Circuit Modeling Tool for Inductively-Coupled Pulsed Accelerators

Inductively-Coupled Pulsed Accelerators (ICPAs), spanning from solid-projectile coilguns to pulsed plasma thrusters, are critical technologies for advanced deep space propulsion. Accurately predicting their performance requires modeling highly coupled electrodynamic and kinematic interactions. Currently, students and engineers lack accessible, interactive tools to simulate these complex systems, often forcing reliance on computationally expensive finite element software or rigid, bespoke scripts. To address this gap, this research presents the development of a novel, comprehensive MATLAB-based simulation application built from the ground up to make ICPA modeling highly accessible. The software employs lumped-element circuit modeling, utilizing Modified Nodal Analysis and Backward Euler integration to simultaneously solve electrical circuit equations and 1D kinematic motion. The core physics engine strictly aligns with established theoretical models, accurately capturing complex phenomena such as dynamic mass entrainment, moving-body current states for plasma loops, and precise calculations of specific impulse and true efficiency. Designed for rapid iteration, the application introduces a unique split-domain interface: an interactive drag-and-drop schematic canvas for intuitive circuit design, paired with a physical geometry dashboard for the spatial staging of multi-coil configurations. Advanced real-time visualization tools, including an interactive mutual inductance profile visualizer, provide immediate feedback on transient currents, voltages, and particle trajectories. By combining rigorous theoretical physics with modern software design, this application provides an unprecedented platform for researchers and students to rapidly prototype ICPA designs, visualize electromagnetic interactions, and conduct comprehensive parameter sweeps.

#068 - Tankersley, Lonnie

Major: Aerospace Engineering - Bachelor of Science
Faculty Research Mentor: Soroush Korivand, Mechanical Engineering
Funding: Micheal W. Hall Mechanical Engineering Department | **Project Category:** Engineering

Embodied Zero-Shot Task Planning via Hardware-Aware LLM–VLM Integration for Physically Grounded Robotic Manipulation

Large Language Models (LLMs) and Vision-Language Models (VLMs) have recently demonstrated impressive zero-shot reasoning and open-world generalization capabilities. However, when deployed in physical robotic systems, these models frequently generate plans that overlook critical embodiment constraints such as joint limits, payload capacity, kinematic reachability, and end-effector morphology. This research proposes a principled framework for embodied zero-shot task execution that explicitly integrates hardware-awareness into the reasoning loop of foundation models. Rather than treating the robot as a generic executor of language-derived plans, we formalize embodiment as a structured, prompt-level representation of the robot's kinematic structure, actuation limits, and manipulation affordances, thereby enabling physically grounded decision-making during high-level task synthesis. The proposed architecture adopts a dual-pathway perception pipeline to support open-vocabulary scene understanding and real-time spatial grounding. A local LLaVA-based module performs deep semantic reasoning over multi-modal visual inputs, while a complementary fast pipeline combining YOLO-World and SAM2 enables category-agnostic object detection and segmentation. These outputs are fused to generate structured semantic scene graphs enriched with metric 3D spatial coordinates, eliminating the need for pre-defined object classes. This structured visual

context is then provided to an LLM-based planning agent alongside an explicit embodiment model of a 7-DoF Franka Emika FR3 manipulator. The LLM synthesizes interpretable, step-wise motion plans that are automatically translated into MoveIt 2 trajectories, ensuring compatibility with the robot's kinematic and dynamic constraints. By grounding reasoning within morphological limitations—such as gripper geometry, reachable workspace, and torque bounds—the system autonomously adapts manipulation strategies for previously unseen, multi-step tasks without task-specific fine-tuning. We validate the framework through comprehensive end-to-end experiments in NVIDIA Isaac Sim, followed by systematic sim-to-real transfer on a physical Franka Emika FR3 platform. Evaluation metrics include physical feasibility rate, execution success rate, planning latency, and robustness under environmental uncertainty. Comparative studies demonstrate that embedding explicit embodiment knowledge significantly reduces infeasible motion proposals and improves execution reliability relative to embodiment-agnostic LLM planning baselines. The results support the hypothesis that integrating structured hardware-awareness into foundation-model reasoning is essential for achieving robust zero-shot manipulation in unstructured environments, advancing the development of general-purpose embodied AI systems capable of reasoning and acting coherently in the physical world.

#085 - Taylor, Brody

Major: Data Science - Bachelor of Science
Faculty Research Mentor: Jonathan Barlow, Data Science
Funding: None | **Project Category:** Physical Sciences

Football Play Analyzer

My project is a football play analyzer. It takes a prompt from the user about a play from a football game and provides a description of how it works and/or why it went wrong. The system accepts user-generated prompts describing a specific play and generates a detailed breakdown of the play design, execution, and contributing factors to its success or failure. Data was collected from YouTube as well as NFL.com to have A.I. analyze the play and explain the outcome. Techniques used, such as web-scraping play-by-play data, with most of my techniques coming from skills learned in data wrangling. The prototype demonstrates the ability to enhance user understanding of offensive and defensive play design by transforming raw game data into interpretable insights. These results I got are important because the project is working and it is so far very useful in my everyday life. Future development aims to incorporate real-time play recognition and automated post-play analysis, expanding the system into a live decision-support tool for fans and analysts.

#287 - Taylor, Morgan

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Richard Baird, Agricultural Science & Plant Protec
Co-Author(s): Chibuike Onyeogulu, Amanda Patrick
Funding: None | **Project Category:** Biological and Life Sciences

Evaluation of Soil Metabolites on Land used for Agrivoltaics Farming

Soil degradation and the need to maximize land productivity remain major challenges in modern agriculture. Continuous cultivation of the same fields depletes essential nutrients, creating conditions that are increasingly unfavorable for both crop growth and the soil's microbial communities. Agrivoltaics-an emerging approach that integrates photovoltaic infrastructure with agricultural production-offers a promising strategy for optimizing land use, as areas suitable for solar installations often overlap with land well-suited for farming. Despite this potential, relatively little is known about how solar panel installations influence the microbial and biochemical processes (i.e. carbon sinks) occurring in the soil beneath them. This study investigates the metabolite composition of soils collected from an agrivoltaics farming research site to elucidate the effects within the broader context of carbon sequestration by plants and soil microbial biomass. Samples were obtained from a vegetated grassland manages with targeted sheep grazing and equipped with solar panels. Three treatment conditions were evaluated: an ungrazed control plot without solar panels, a grazed control plot without solar panels, and a grazed plot containing solar panels. Soil metabolites were extracted using an isopropanol/methanol/water solvent system, followed by derivatization to enhance the volatility of analytes prior to gas chromatography-mass spectrometry (GC-MS) analysis. Metabolites were identified by comparing

electron ionization (EI) mass spectra obtained to entries in the Wiley Registry 12th Edition/NIST 2020 Mass Spectral Library (Hoboken, NJ), applying a minimum similarity threshold of 70%.

#124 - Tedford, Bradley

Major: History - Bachelor of Arts
Faculty Research Mentor: Morgan Flow, History
Funding: None | **Project Category:** Humanities

A "State-Sanctioned Amnesia": How History Shaped and Stunted Mississippi's Curriculum

This paper argues that Mississippi's curriculum, specifically social studies, performed as a "state-sanctioned amnesia" from the end of Reconstruction to the early 2000's. This idea came from the control of textbooks, politics, racism, and unequal schooling that reshaped historical subjects such as the Civil War, slavery, Reconstruction, and the Civil Rights movement. After the "Redeemer" Democrats reasserted their power, Mississippi's 1890 constitution standardized segregated schooling and created a two-tier system. White schools in this system were better funded and reinforced romanticized narratives of the Confederate past, all while Black schools were underfunded with controlled content. This paper tracks how Lost Cause ideology was apparent in state-approved textbooks through pro-southern romanticized institutions while Black agency was mostly omitted. A primary example of curriculum suppression is evident in policies that prevented Black schools from teaching civics along with historical alterations. This demonstration reveals the minimization of political awareness and upholds of Jim Crow. **This** paper looks at Mississippi's history by studying the curriculum, state textbooks, and what was taught in school. It also includes Mississippi noncompliance and pro-segregation textbooks. The paper also looks at the challenges to this authority during the Civil Rights era through Freedom Schools, African American history, and federal government intervention. One main finding is that changes in the Mississippi curriculum didn't stem from voluntary state action, but from prolonged litigation and external pressure. This is evident in the controversies over textbook approval court rulings that mandated adoption in spite of several objections. **This** paper shows how Mississippi Curriculum revealed how controlling historical memory can reinforce inequality, while also demonstrating how romanticized narratives limited historical accuracy and normalized white supremacy. Though textbooks became more historically accurate and widely accessible by the 2000's, distortions in narratives continued to change and structure how many understood and interpreted history.

#184 - Temple, Carson

Major: Biological Sciences - Bachelor of Science
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: ORED Undergraduate Research Program | **Project Category:** Social Sciences

Relation Between Emotional Dysregulation and Negative Urgency: Moderation by Executive Function

Relation Between Emotional Dysregulation and Negative Urgency: Moderation by Executive Function.
Singh and Singh (2023) found that higher emotional dysregulation was significantly associated with greater engagement in health-risk behaviors. Wüllhorst et al. (2025) found that higher negative urgency was linked to altered neural markers of response inhibition and faster but less effective attempts to inhibit actions, supporting negative urgency as a relevant impulsivity-related outcome in the present study. Dumont et al. (2024) found that behavioral inhibition predicted anxiety only at low levels of executive function, indicating that executive function served as a protective moderator in shaping emotional processes. The present study examines whether emotional dysregulation predicts negative urgency and whether executive function moderates this relationship. Participants included 500 emerging adults who ranged from 18 to 26 years (M = 19.75, SD = 1.87). Participants reported on their gender (58.4% female, 41.6% male). The UPPS-P (Lynam et al., 2006) was used to measure negative urgency. To measure executive function, participants completed the CEFI (Naglieri & Goldstein, 2024). To assess emotional dysregulation, the DERS (Gratz & Roemer, 2004) was used. PROCESS 4.2 (Hayes, 2022) model 1 was used to conduct a moderation analysis. The model used to predict negative urgency was significant, $R^2 = .38$, $F(3, 473) = 95.06$, $p < .001$. Emotional

dysregulation was associated positively with negative urgency, B = 0.06, SE = 0.01, p < .001. Executive function was associated negatively with negative urgency, B = -0.97, SE =0.23, p < .001. The interaction between emotional dysregulation and executive function was not significant, B = 0.01, SE = 0.10, p = .223. This study examined whether emotional dysregulation predicted negative urgency and whether executive function moderated this relationship. Results indicated that both emotional dysregulation and executive function independently predicted negative urgency; however, their interaction was not significant.

#095 - Thaggard, Rachel

Major: Communication - Bachelor of Arts
Faculty Research Mentor: Tonya Hays, Communication
Co-Author(s): Greg Thorn
Funding: None | **Project Category:** Arts, Music, & Design

Acting in Technicolor: The Use of Color Psychology As a Directing Practice in Theatre.

This research project includes findings centered around the subjective perception of color psychology as viewed by actors in the production of Fahrenheit 451, a production produced by TheatreMSU. In collaboration with the computer science program, Performance Practicum (CO 3541), and other faculty and students within the theatre department, Rachel-Kate Thaggard (Director of the production) has researched findings centered around color psychology, as well as conducted surveys and interviews of cast members who all have vastly different perspectives and ties to the meanings of different colors. This research concludes that while no one color represents an identical meaning to one mind, all colors have distinct effects on individuals psyche, and such associations can be used as an effective tool in theatrical character development.

#288 - Thoman, Samantha

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Carrie Vance, Biochemistry Nutrition Health Promo
Co-Author(s): Samantha Shablin, Samuel Mathes, Austin Simpson, Andy Kouba, Carrie Kouba
Funding: None | **Project Category:** Biological and Life Sciences

Differences in dermal cortisol levels in the eastern hellbender (*Cryptobranchus alleganiensis)* infected with saphrolegnia

The eastern hellbender (*Cryptobranchus alleganiensis*) is a fully aquatic giant salamander that is experiencing population declines across much of its range due to degraded habitat. To combat population declines and ensure the persistence of this species, captive assurance colonies have been established. However, captive hellbender populations, like other aquatic organisms, are susceptible to saprolegnia is, a fungal infection of the skin of aquatic organisms. If left unchecked, this fungus can disrupt osmotic balance and cause mortality. Monitoring physiological changes, such as through cortisol levels, is helpful for assessing animal health, as elevated cortisol is frequently viewed as a reliable bioindicator of stress and physiological condition in response to environmental change. Here, we use non-invasive dermal swabbing of the dorsal, ventral, and gular regions of captive hellbenders to quantify cortisol concentrations in uninfected (N = 12) and *Saprolegnia*-infected (N = 4) individuals. An Arbor Assays ISWE cortisol enzyme immunoassay was biochemically validated and used to quantify dermal cortisol concentrations. Assay validation included Pearson's product-moment correlation to test parallelism between serially diluted dermal cortisol samples and spike recovery analysis by adding known concentrations of cortisol standards to samples and determining recovery after quantification. The correlation coefficient for dermal secretions was 0.997, and spike recovery was 88.4%, both of which are within acceptable ranges for biochemical validation. On average, hellbenders infected with *Saprolegnia* exhibited significantly higher cortisol concentrations than uninfected individuals ($p=0.002$). Across both groups, dorsal and ventral swabs had significantly higher cortisol concentrations than chin swabs ($p < 0.003$), while dorsal and ventral concentrations did not significantly differ ($p > 0.05$). However, it's possible that elevated cortisol concentrations in infected animals may be influenced by fungal interference with the assay, indicating that further testing is necessary to confirm these findings. Dermal cortisol sampling shows promise but requires further validation in infected individuals.

#069 – Jayla Travis

Major: Software Engineering
Faculty Research Mentor: Dr. Daniel Carruth & Dr. Christopher R. Hudson; Secondary: Tyler Hannis
Co-Author(s): Tyler Hannis, Daniel Carruth, Christopher Hudson
Funding: BRIDGES | **Project Category:** Engineering

Decoding Mobility: CAN Bus Data Interpretation for Vehicle Control

Standing over 6 feet tall, the MuddTrax MTX-C is a high-performance, all-terrain utility vehicle equipped with 18-inch tracks featuring 1.5-inch paddles for enhanced maneuverability. This project began by investigating the vehicle's CAN bus network in order to understand how operational data is transmitted throughout the system and to explore the feasibility of implementing remote vehicle control using a game controller. Initial work involved analyzing CAN bus protocols and interpreting individual message fields associated with vehicle subsystems. Through systematic data collection and message analysis, it was determined that the native CAN messages on the MTX-C are primarily used for system monitoring and logging rather than direct vehicle control. Because the vehicle was not originally designed to support remote drive commands, a new control approach was required. A joystick intercept interface was developed to receive remote control CAN messages, interpret them using an onboard microcontroller, and inject equivalent signals that mimic the vehicle's native joystick inputs. This architecture allows controller inputs from a standard game controller to be translated into vehicle motion commands while maintaining compatibility with the vehicle's existing systems. A Python-based software framework was developed to capture controller inputs and transmit corresponding CAN-based control messages to the joystick intercept board. These messages are then interpreted by the microcontroller and converted into equivalent joystick signals that drive the vehicle's forward, reverse, and skid-steer movements. This work is ongoing and continues to expand the system's capabilities. Current development focuses on refining control responsiveness and integrating additional sensors, monitoring systems, and user feedback tools to improve system visibility and operator awareness. These enhancements aim to provide improved diagnostics, better situational awareness, and more reliable vehicle operation while further advancing the controller-to-vehicle communication framework.

#289 - Uldrich, Ellianna

Major: Biological Sciences - Bachelor of Science
Faculty Research Mentor: Russell Carr, Department of Comparative Bio Science
Co-Author(s): Shirley Guo-Ross, Kendall McKinnon, Hayden Anderson, Lexi Holdiness, Hannah Mask
Funding: Carr Laboratory | **Project Category:** Biological and Life Sciences

Effects of Acute Exposure to the Organophosphorus Insecticide Metabolite Chlorpyrifos-Oxon on Carboxylesterase Activity in Juvenile Rats

Chlorpyrifos (CPF) is one of the most common organophosphorus insecticides. CPF exerts its toxicity through the inhibition of acetylcholinesterase (AChE) in the brain. However, CPF itself cannot inhibit AChE, rather its active metabolite, chlorpyrifos-oxon (CPO), does. This inhibition leads to the accumulation of the neurotransmitter acetylcholine, overstimulation of the cholinergic system, and shutdown of the respiratory system. In addition to AChE, CPO inhibits carboxylesterase (CES), an essential serine hydrolase enzyme in the blood and liver. The binding of CPO to CES in the blood effectively reduces the number of molecules of CPO in the circulatory system. This means fewer molecules of CPO are available to reach the brain and exert toxicity. In adults, the activity of CES is reduced as the level of CPO exposure increases to the point of total saturation at high-level exposure. Juvenile animals are more sensitive to the toxicological effects of CPO. The mechanisms of CES inhibition induced by CPO are not clear. The purpose of this project was to determine the dose-response relationship between CPO and the inhibition of blood CES activity. To investigate this, 21-day-old rat pups were subcutaneously administered either vehicle or different

dosages of CPO (0.5, 0.75, 1.0, 1.25, 1.5, 1.75, 2.0, 2.5, 3.0, 3.5, or 4.0 mg/kg). After 3 hours, blood was collected and centrifuged to obtain serum. The activity of serum CES was determined. As the CPO exposure level increased, the level of CES inhibition increased. However, at the high exposure levels, the activity of CES did not reach a point where it was totally saturated. Maximum inhibition of CES was ~70% in the juvenile rats as opposed to greater than 97% observed in adults in previous studies. The reason for this discrepancy is unclear.

#070 - Upreti, Saphal

Major: Computer Engineering - Bachelor of Science
University: Mississippi State University
Faculty Research Mentor: Jingdao Chen, Computer Science and Engineering
Co-Author(s): Niranjan Giri, Charles Raine, Leonel Giacobbe, Ashmit Kumar Mishra, Jinhee Yu
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Engineering

Vision-Language Enhanced Digital Twins

This project developed a professional web-based dashboard to help the construction industry manage 3D site data more effectively. Because 3D files are often too large for standard web browsers, I used React and Three.js along with advanced programming techniques like multi-threading to ensure the maps run smoothly without lagging. The interface allows users to easily rotate, zoom, and inspect 3D models of building sites in real-time. A key feature is the text-based query system, which lets users control the 3D scene by typing simple commands rather than using complex menus. By optimizing how data is transferred and processed, the system reduces memory usage and provides an intuitive way for stakeholders to interact with complex spatial information. Future work will focus on scaling this technology for even larger construction projects and improving object detection.

#290 - Van Herik, Sophie

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Caleb Lemley, Animal & Dairy Science
Co-Author(s): Hala El Daous, Hala El Daous, Shiveeli Rajput, Justin Maynard, Alaina Hansen, Caleb Lemley
Funding: USDA Agricultural Research Service | **Project Category:** Biological and Life Sciences

Effects of Heat Stress and Melatonin on the Metabolome of Bovine Endometrial Epithelial Cells

Bovine endometrial epithelial cells are found in the uterus and were used to study the effects of melatonin on metabolite expression. Melatonin, known for its antioxidant properties, has been used to treat heat stress and thermoregulatory deficits. BEND cells were cultured under either thermal neutral conditions (38.5 °C) or heat stress (41.0 °C) for 24 hours. Concurrently, cells were treated with 10 nM melatonin or left untreated, following a 2 × 2 factorial design. After treatment, cells were harvested by scraping and washed three times with PBS via centrifugation at 150 × g. Following the final wash, cell pellets were flash-frozen and submitted to Creative Proteomics for untargeted metabolomics analysis. Statistical analysis was performed using RStudio to examine the effects of heat stress, melatonin treatment, or their respective interactions. Across the metabolome, heat stress (HS; 41.0°C) induced broad alterations in BEND cell metabolite abundance relative to thermal neutral (TN; 38.5°C) conditions, with a greater proportion of metabolites decreased than increased. Notably, several lipid-associated metabolites were reduced under HS, including eicosapentaenoic acid ($P = 0.0002$), docosahexaenoic acid ($P = 0.0073$), pinolenic acid ($P = 0.0064$), and stearic acid ($P = 0.019$), indicating suppression or redistribution of lipid metabolic pathways. In contrast, select amino acid and stress-associated metabolites were elevated during HS, including leucylasparagine ($P = 0.013$) and inosine ($P = 0.022$), consistent with adaptive cellular stress responses. Melatonin exerted comparatively modest main effects under TN conditions; however, under HS conditions, melatonin altered some HS-induced changes by increasing metabolites elevated during stress (e.g., leucylasparagine and inosine) and partially restoring others toward TN concentrations, supporting the hypothesis that melatonin alters key components of the heat stress–induced metabolic perturbation in BEND cells. Future research should focus on these specific metabolites and their effects to improve reproductive conditions.

#291 - Vanga, Vineel

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Galen Collins, Biochemistry Nutrition Health Promo
Co-Author(s): Cole Beard
Funding: College of Agriculture and Life Sciences URSP | **Project Category:** Biological and Life Sciences

Does Ubiquitin activate Ddi2's Retroviral Protease Domain in Trans?

The Ubiquitin Proteasome Pathway (UPP) critically regulates cellular homeostasis by degrading excess or damaged proteins. It does so by first attaching the protein ubiquitin to target substrates, then degrading them via the 26S proteasome. A crucial but understudied player in this pathway is DNA damage-inducible protein 2 (Ddi2). Ddi2 has two currently known functions: it can deliver ubiquitylated proteins to proteasomes for degradation, and it can itself cleave proteins using its retroviral protease domain. Ddi2 also mediates cancer cells' ability to escape immune detection. Previous studies showed that retroviral protease inhibitors designed for HIV increase MHC-I levels on the cell surface, thereby restoring immune recognition of cancer cells. Our model is that Ddi2 somehow facilitates the degradation of MHC-I molecules. We are exploring how Ddi2 is regulated by binding to ubiquitylated conjugates using computational modeling. We are testing if Ddi2 is allosterically activated by ubiquitylation using AlphaFold2 (DeepMind) and ChimeraX (UCSF). We are also exploring the interactions of Ddi2 with other retroviral proteases from the human genome, suggesting that they need not only function as homodimers, but may also work as heterodimers.

#185 - Vann, Jenesis

Major: Psychology - Bachelor of Science
Faculty Research Mentor: Danielle Nadorff, Psychology
Co-Author(s): Amara Mason
Funding: None | **Project Category:** Social Sciences

Caregiver Type and Mental Health in Emerging Adulthood: The Moderating Role of Perceived Social Support

Emerging adulthood (ages 18–25) is an essential developmental period characterized by heightened vulnerability to anxiety and depression. During this stage, individuals experience substantial transitions in education, relationships, and independence, which may amplify psychological distress. Kinship care refers to placement with relatives or close family friends, whereas parental care refers to being raised by one's biological or adoptive parents. Because caregiving environments may differ in levels of stability, stress, and access to resources, caregiver type may represent an important contextual factor influencing long-term mental health outcomes for this population. The present study examines whether caregiver type (kinship vs. parental care) is associated with mental health outcomes, specifically anxiety and depression, in emerging adults at a large southern university in the U.S. guided by the Stress-Buffering Hypothesis, this study also investigates whether perceived social support moderates the relation between caregiver type and mental health. It is hypothesized that emerging adults who experienced kinship care will report higher levels of anxiety and depression compared to those raised by parents, particularly when perceived social support is low. Conversely, high levels of perceived social support are expected to weaken or eliminate the association between kinship care and psychological distress. Data collection and analysis are currently in progress and will be completed prior to presentation at the symposium.

#096 - Walker, Kailey

Major: Interior Design - Bachelor of Science
Faculty Research Mentor: Tarlan Abazari, Interior Design
Funding: CAAD Catalyst Grant | **Project Category:** Arts, Music, & Design

Virtual Reality–Assisted Biophilic Design for Improving Indoor Health and Productivity in Academic Environments

This in-progress study examines how architectural parameters informed by biophilic design influence indoor health, cognitive performance, and productivity in academic environments. Using Etheredge Hall at Mississippi State University as a case study, the research investigates the effects of window size, natural daylight access, indoor material selection, space planning strategies, indoor greenery, and visual connections to outdoor environments on occupant well-being and learning effectiveness. The objective is to identify evidence-based architectural interventions that enhance academic performance through improved spatial quality. A mixed-method framework integrates digital modeling tools with participatory workshops to evaluate user engagement and spatial perception. Existing conditions are documented through material research and spatial analysis. Building Information Modeling (BIM) in Revit is used to develop alternative design scenarios that test variations in daylight penetration, greenery integration, material application, and classroom configurations. These models are exported to Unity to create immersive virtual environments that simulate spatial experience and environmental performance. Participatory workshops will be conducted in the next phase within these immersive simulations to assess user interaction, perceived comfort, and cognitive engagement. Qualitative feedback and observational data will be analyzed alongside spatial metrics to evaluate how specific architectural parameters influence productivity and well-being. Expected results suggest that increased window dimensions, stronger visual access to nature, strategic indoor greenery placement, and efficiently organized horizontal layouts may positively impact perceived productivity and cognitive focus. By combining immersive visualization technologies with user-centered evaluation, this research aims to provide actionable insights for architects and interior designers seeking to integrate biophilic principles into academic interiors. The study ultimately supports the development of healthier, performance-oriented learning environments through informed spatial planning and advanced digital methodologies.

#292 - Walker, Kaylynn

Major: Biochemistry - Bachelor of Science
Faculty Research Mentor: Jiaxu Li, Biochemistry Nutrition Health Promo
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Biological and Life Sciences

Analysis of histone H2B and its modifications in abiotic stress response in rice

Abiotic stresses such as drought and salinity are major factors limiting crop production, and improving plant resilience to these stresses is essential for sustainable agricultural productivity. Epigenetic mechanisms, including histone post-translational modifications, play important roles in regulating plant responses to environmental stress. Histone H2B is a core nucleosomal protein that contributes to chromatin organization and regulation of gene expression. One important post-translational modification of H2B is monoubiquitination, which can alter nucleosome dynamics and regulate the accessibility of DNA to transcription factors. These changes can influence gene expression, including genes involved in plant stress responses. The objective of this study was to determine whether histone H2B levels and H2B monoubiquitination change in response to dehydration and salinity stress in rice plants. One-month-old hydroponically grown rice plants were subjected to dehydration or salinity stress. Histone proteins were extracted from leaves and roots and analyzed by SDS-polyacrylamide gel electrophoresis followed by immunoblotting with antibodies specific to histone H2B or monoubiquitinated H2B. Histone H2B protein levels did not change in response to either dehydration or salinity stress. However, stress-dependent changes in H2B monoubiquitination were observed only in leaves, while roots showed no detectable changes in this modification. In leaves, H2B monoubiquitination levels were significantly reduced during dehydration stress but increased following prolonged

salinity treatment. These findings indicate that H2B monoubiquitination responds differently to dehydration and salinity stress and may play distinct regulatory roles in plant responses to different abiotic stresses. Further studies examining the effects of H2B monoubiquitination on stress-responsive gene transcription will help clarify its functional role in adaptation to a changing environment.

#293 - Walker, Makayla

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Kelsey Harvey, Prairie Research Unit
Co-Author(s): Kelsey Harvey, Brooklyn Laubinger, Madeline McKnight, Jane Parish
Funding: None | **Project Category:** Biological and Life Sciences

The Impact of Maternal Aggression in Beef Cattle on Productivity

Productivity in beef cows is determined by a dam's ability to efficiently raise and wean one calf each year. Prior research suggested that maternal behavior, such as maternal aggression score (**MA**), influences the performance of offspring. The objective of this study was to evaluate the effect of MA on dam and calf performance. This study was conducted over 12 calving seasons from 2017 to 2022. Maternal aggression was measured on a 5-point scale, with lesser values reflecting increased docility and greater values indicating increased aggression. Within 24 h of calving, MA, dam body condition score (**BCS**) and calf body weight (**BW**) were recorded. At weaning, calf weaning BW (**WW**) was recorded. Data were analyzed using the PROC MIXED function of SAS v9.4. At calving, BCS was affected by MA ($P = 0.08$); dams with MA score 4 had greater ($P < 0.05$) BCS compared to MA score 1 dams. No differences were detected ($P \geq 0.55$) for calf birth or weaning BW. Calf average daily gain (ADG) from birth to weaning was affected by MA ($P = 0.01$); calves born to MA 5 dams had reduced ADG ($P \leq 0.05$) compared to other scores. Calf WW was affected ($P < 0.01$) by MA score as calves born to MA 3 and 4 dams had greater ($P \leq 0.05$) 205-d adjusted weaning BW compared to those born to MA 1, 2, or 5. Weaning rate was affected ($P = 0.01$) by MA, as cows with MA score 1 ($P \leq 0.05$) had a reduced weaning rate compared to all other scores. In conclusion, these findings demonstrate that MA influences cow and calf productivity; further research is investigating cow temperament during the production cycle with MA.

#071 - Walker, Nora

Major: Agribusiness - Bachelor of Science
Faculty Research Mentor: Jessica Drewry, Ag & Bio Engineering
Co-Author(s): Mack Cihal, Jessica Drewry, J. Wes Lowe
Funding: None | **Project Category:** Engineering

Survey of Combine Harvest Losses in Mississippi

In the fall, you may see a lot of fields that are covered in green plants. Many think that it is just cover crop, and a lot of times it is, but sometimes the crops you see have resulted from harvest loss. Harvest loss refers to when farmers lose a portion of their crop during harvesting. There are many causes, but some primary reasons are improper header alignment and mechanical wear. Farmers all across Mississippi struggle with harvest loss causing them to potentially lose millions of dollars each year. We measured the loss from several different farmers, all with different equipment brands to see if we could pinpoint where on the combine most of the harvest loss occurred. Our results suggested that most of the harvest loss came from the header loss rather than the separation losses. We failed to detect a significant difference in header loss with respect to location on the header in both corn and soybeans. We found the header loss for corn and soybeans to be 1.5 ± 1.2 and 1.2 ± 1.3 Bu/acre, respectively. This data suggests a large variation of losses between producers and indicates increasing education may be needed to reduce losses.

#072 - Watkins, Joseph

Major: Mechanical Engineering - Bachelor of Science
Faculty Research Mentor: Soroush Korivand, Mechanical Engineering
Co-Author(s): Alejandro Castellon
Funding: None | **Project Category:** Engineering

Autonomous Perception-to-Manufacturing Pipeline for Robotic 3D Bust Fabrication

The proposed research investigates the development of a fully autonomous perception-to-manufacturing pipeline capable of transforming a live human subject into a precision-machined bust without manual intervention. The system integrates active robotic perception, photogrammetric 3D reconstruction, automated CAM toolpath generation, and coordinated robotic material handling within a unified digital manufacturing cell. A 6-DOF collaborative robot equipped with an end-effector-mounted camera performs structured multi-view image acquisition of the subject's head, where viewpoint selection and trajectory planning are treated as optimization problems rather than pre-programmed motions. The captured data are processed into a high-resolution mesh model through a photogrammetry engine, forming a digital twin that is automatically translated into collision-aware 5-axis CNC toolpaths. A second collaborative robot coordinates stock loading, part transfer, and machine tending to enable uninterrupted operation. Beyond system integration, this research addresses fundamental questions in active perception, reconstruction fidelity, and autonomous manufacturing. The study evaluates how robotic camera waypoint density, image overlap, and coverage geometry influence reconstruction resolution and surface accuracy, and quantifies the tradeoffs between scanning time, mesh quality, and machining performance. Automated mesh conditioning and adaptive toolpath refinement are investigated to preserve fine geometric features while minimizing machining time and surface scallop height. Closed-loop validation methods—such as post-machining 3D scanning and deviation heatmap analysis—are incorporated to assess geometric error and enable adaptive re-machining when necessary. These investigations establish measurable relationships between perception quality, digital model uncertainty, and final manufactured accuracy. The broader objective is to establish a generalizable framework for autonomous fabrication of complex freeform geometries, extending beyond artistic bust production to applications in personalized prosthetics, custom orthotics, rapid sculpture manufacturing, and human-centered digital twin generation. By tightly coupling robotic sensing, computational geometry, and subtractive manufacturing in a closed-loop architecture, this work advances the state of autonomous manufacturing systems capable of reasoning from perception to physical realization. The project contributes new methodologies in active viewpoint planning, automated mesh-to-toolpath conversion, and multi-robot CNC cell coordination, providing a scalable foundation for next-generation intelligent manufacturing environments.

#073 - Watson, Samuel

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Zack Murphy, Ag & Bio Engineering
Co-Author(s): David Van den Heever, William Lambert
Funding: None | **Project Category:** Engineering

Exploration of FPVS EEG as a Method to Evaluate and Quantify Cognitive Decline

Cognitive decline is a natural process that profoundly impacts both patients and their caregivers. Current diagnostic tools are often limited in their ability to identify the disease at its earliest stages, highlighting a critical need for non-invasive, objective methodologies that, paired with other testing, enable earlier clinical intervention. This study utilizes Fast Periodic Visual Stimulation (FPVS) in conjunction with electroencephalography (EEG) to examine specific neural deficits associated with patients with cognitive decline. Subjects are presented with a rapid stream of baseline images at 6 Hz, mixed with a periodic "oddball" stimulus occurring at 1.2 Hz. This frequency-tagging approach allows for the isolation of specific brain responses from background neural noise, producing robust, statistically significant responses in under two minutes. The study targets three primary cognitive domains known to be impaired in many types of individuals: emotional recognition, semantic categorization, and working memory. We hypothesize that patients experiencing severe cognitive decline will demonstrate a significant reduction in neural response at the oddball frequency compared to healthy, age-matched controls for each of these tests. By identifying these functional biomarkers in the early stages of the disease, this research aims to provide a scalable, non-invasive framework for improving the longevity and quality of life for those at risk of cognitive decline conditions.

#294 - Watts, Kassie

Major: Animal and Dairy Science - Bachelor of Science
Faculty Research Mentor: Kelsey Harvey, Prairie Research Unit
Co-Author(s): W. Isaac Jumper, Madeline McKnight, Brooklyn Laubinger, Kelsey Harvey
Funding: None | **Project Category:** Biological and Life Sciences

Evaluating preference and consumption patterns of a chlortetracycline-containing mineral supplement in commercial beef cows

High variability in free-choice mineral intake raises concerns regarding consistent delivery and effectiveness of chlortetracycline (**CTC**) in commercial beef cattle. The objective of this study was to evaluate preference and consumption patterns of a CTC-containing mineral supplement compared to non-CTC containing mineral in commercial beef cows. A total of 64 crossbred beef cows (mean age=5.5 ± 0.36 years) were enrolled in this study (32 cows per experiment). Within the experiment, cows were ranked by age and body weight (**BW**; mean BW=596.43 ± 8.09kg) and assigned to a crossover design consisting of two 14-day periods, wherein cows were housed in 1 of 4 drylot pens equipped with the Vytelle Sense individual feed intake monitoring software. Within each period, cows were assigned to 1 of 2 treatments: free choice access to mineral supplement containing CTC or not (**CON**). Each pen included 4 feed bunks, one containing mineral supplement and three containing chopped hay. Hay and mineral were offered ad libitum daily. Cow BW and body condition score (**BCS**) were recorded on d 0, 14, and 28 while mineral intake and hay intake were recorded daily. Data were analyzed using the MIXED procedure of SAS v.9.4 with cow as the experimental unit. No treatment × day or main treatment effects were detected ($P \geq 0.18$) for hay dry matter intake or mineral intake. Likewise, no treatment × day or main treatment effects were detected for BW ($P \geq 0.45$) or BCS ($P \geq 0.35$). In conclusion, inclusion of CTC in a free-choice mineral supplement did not affect mineral intake under drylot conditions, indicating that CTC did not reduce palatability. Given previously observed inadequate intake in pasture systems, these results suggest that environmental or behavioral factors rather than palatability may limit CTC consumption. Further evaluation under pasture conditions is warranted.

#074 - Watts, Kellie

Major: Data Science - Bachelor of Science
Faculty Research Mentor: Jonathan Barlow, Data Science
Funding: None | **Project Category:** Engineering

The Trust-Performance Problem (TPP): Measuring Calibrated Trust in Business AI Systems through Behavioral Decision Tasks

The world is witnessing a surge in corporations integrating AI to reconfigure their systematic processes. While many see endless potential, others question the legitimacy and credibility of these systems and their increasing role in the business world. The primary problem is the under-studied phenomenon of trust in new technology. This project aims to investigate the unexplored relationship between how much people say they trust AI systems in the business world versus how much they refer to or use the systems when participating in critical decision-making. The study will use an interactive survey, in which users will be presented with realistic scenarios that might be encountered in the marketing world. It will require the participants to make decisions with or without AI assistance and then report the reasoning behind their decisions. The AI's advice will feature various levels of accuracy as it provides the users suggestions on how to solve the scenario. After completing each scenario, participants will be asked to rate how confident they felt about the scenarios and ascertain how closely they followed the AI's suggestions, The platform will collect both explicit trust measures (confidence ratings) and implicit behavioral measures (whether participants follow AI recommendations). After completing all designed scenarios, participants will receive a personalized "trust calibration profile" showing where they over-trusted, under-trusted, or appropriately trusted the AI systems.

#295 - Webber, Courtney

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Peter Allen, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Abby McGregor
Funding: ORED Undergraduate Research Program | **Project Category:** Biological and Life Sciences

Blood ion concentrations in elasmobranchs from the Gulf of Mexico

Objective: The Gulf of Mexico is home to a diverse assemblage of elasmobranchs and varying environmental conditions. The integument of elasmobranchs is relatively permeable compared to teleost fishes; regulation of blood ion concentrations may impact their adaptability to changing environments. However, little is known of blood ion concentrations in these species and the correlation between blood ion concentrations and environmental conditions. Therefore, the objective of this study was to measure blood ion concentrations in elasmobranchs from the Gulf of Mexico to create a baseline for future studies on the influence of seasonal environmental changes.
Methods: Elasmobranchs were caught via bottom longline surveys, hook and line sampling, and trawl nets. Blood was collected from both living and recently deceased specimens, centrifuged, and stored at -80°C prior to analysis. Plasma was analyzed for anions (Cl^-, NO_2^-, Br^-, NO_3^-, PO_4^3, and SO_4^{2-}) and cations (Na^+, NH_4^+, K^+, Mg^{2+}, and Ca^{2+}) using an ion chromatography system. **Results:** A total of 141 species were collected, including Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*; n = 57), Smoothhound Shark (*Mustelus sp.*; n = 16), Bull Shark (*Carcharhinus leucas*; n = 13), and Spinner Shark (*Carcharhinus brevipinna*; n = 12). In general, ion concentrations were generally lower in living than deceased fish. The mean anion concentrations were generally comparable between living and dead fish for chloride (Cl^-), bromide (Br^-), and nitrate (NO_3^-), with the notable exception of phosphate (PO_4^3). Phosphate (PO_4^3) was consistently elevated (~117%) in deceased individuals. In contrast, cation concentrations between living and dead fish differed greatly. **Conclusions:** These data provide some of the first information on blood ion concentrations for many of the species sampled. Moreover, the data provides insight into the value of samples from living and deceased specimens and establishes a baseline useful for future studies.

#296 - Welliver, Rilee

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Curtis Coleman, FWRC - Wildlife, Fisheries & Aquaculture
Funding: North American Pollinator Protection Campaign | **Project Category:** Biological and Life Sciences

"What's The Buzz?" - Precision and Efficiency Comparison of Human vs. Automated Honey Bee Counting Methods

The honeybee (Apis mellifera) plays a vital role in ecosystem function and agricultural production, as well as being the most widely managed generalist pollinator across the world. There has been an increase in over-wintering colony loss around the globe due to factors such as pathogens, parasites, habitat loss, poor nutrition, and even pesticides. This solidifies the need for beekeepers to be able to closely and consistently monitor hive activities to keep track of honeybee health and allow for faster response to potential health threats. Some of the methods used to do this are beekeeping oversight and the use of automated in-hive metric collection systems. Optical bee counters are one method of automated data collection that has been around for centuries, with both commercial and scientific use. However, to use these tools optimally, one must validate their performance via multiple methods that have yet to be succinctly compared in the literature. This study aims to analyze three different method's ability to precisely count bee movement through an optical bee counter installed to the entrance of an empty hive meant for nearby colonies to "steal" out of. Our first method involves real-time counting of entering and exiting bees through the bee counter, while the second method counts passing bees from video recordings taken in the field. The final method utilizes data from the optical bee counter itself where the daily net count should theoretically be zero. This study gives insight into the pros and cons of human vs. automated observation, highlighting appropriate validation techniques and the degree of precision for these optical bee counters. In turn, this knowledge will improve the efficient use of optical bee counters for research and commercial purposes regarding honey bee health

#075 - West, Emalee

Major: Chemical Engineering - Bachelor of Science
Faculty Research Mentor: Julie Jessop, Chemical Engineering
Co-Author(s): Finnis Ginder, Sage Schissel
Funding: Dr. Julie Jessop Research Lab | **Project Category:** Engineering

The Best of Both Worlds: How EB-polymerized hybrid films exhibit enhanced properties and low environmental impact

Using electron-beam (EB) radiation to initiate polymerization has high environmental, technical, and financial benefits compared to traditional UV and thermal polymerizations. In EB polymerization, accelerated electrons are focused on monomers in a nitrogen-inerted chamber to polymerize them to a substrate in a matter of seconds, requiring no heating, cooling, or solvent. In this research, hybrid films containing 3,4-epoxycyclohexylmethyl 3,4- epoxycyclohexanecarboxylate (EEC, cycloaliphatic diepoxide) and hydroxyethyl acrylate (HEA, hydroxylated acrylate) were polymerized to aluminum plating using EB radiation. EEC films independently have high hardness and long cure times, whereas HEA films have low cure times and are flexible but lack hardness. Polymerization of hybrid mixtures to metal substrates is of high interest to the metal coating industry, and EEC was chosen due to its commercial relevance. HEA induces the AM (activated monomer) mechanism, which decreases cure time and brittleness in the resulting grafted polymer network. Hybrid mixtures ranged from 30wt% to 80wt% EEC combined with 1%, 3%, or 5% (by weight) diaryliodonium hexafluoroantimonate (DAI, cationic photoinitiator). Properties of EEC/HEA mixtures after polymerization to an aluminum substrate were quantified through impact, hardness, tack, bending, and adhesion testing. Compared to photopolymerized EEC/HEA hybrid films previously tested, EB polymerized hybrid films in equal weight of EEC/HEA and 3wt% DAI showed the highest potential to be used industrially.

#076 - White, India

Major: Biomedical Engineering - Bachelor of Science
Faculty Research Mentor: Lauren Priddy, Ag & Bio Engineering
Co-Author(s): Seungil Kim, Muaz Chaudhry
Funding: ORED Undergrad Research Program, Bagley Undergrad Research Award | **Project Category:** Engineering

Cellular and Physicochemical Effects of Ascorbic Acid-Polyurethane Coatings on Magnesium

In recent years, degradable biomaterials have gained significant attention for use as orthopedic implants because they can address challenges associated with permanent implants, including stress shielding, wear debris formation, and revision surgery. Among these materials, magnesium has shown promise due to its mechanical properties, which are comparable to bone, as well as its biocompatibility and function in biological processes. However, magnesium degrades too rapidly in the body's environment. Our group has demonstrated that applying a hydroxyapatite coating to the surface of magnesium modulates its degradation. Here, a biocompatible ascorbic acid conjugated polyurethane (AA-PU) was coated on magnesium. The aims of this research were to evaluate over 28 days: (i) the efficacy of this AA-PU coating in promoting preosteoblast proliferation and osteogenesis, and (ii) the effects of the coating on the physicochemical properties of the magnesium substrate. Cell viability assays, along with calcium and alkaline phosphatase assays, were utilized to quantify cell proliferation and osteogenesis, respectively. The degradation profile was assessed through measurements of mass, surface roughness, and water contact angle. The AA-PU coating promoted more cell proliferation throughout the study compared to the noncoated magnesium samples. The coating also reduced the degradation rate of magnesium and improved surface wettability over time. While promising trends in osteogenesis were observed with the AA-PU coating, the concentration of AA available to the cells and/or the duration of the study may have been insufficient to detect a significant difference between the AA-PU-coated and noncoated groups. Ultimately, the AA-PU coating demonstrates promising efficacy in enhancing the cellular and physicochemical behavior of magnesium. In future studies, we will leverage these findings to fine-tune the AA-PU and magnesium surface chemistry, creating a more controlled interfacial environment tailored to target applications, particularly biodegradable orthopedic implants for regenerative medicine.

#297 - Wilburn, Allie

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Dana Morin, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Anthony Ballard, Dana Morin, Anthony Ballard
Funding: ORED Undergraduate Research Program | **Project Category:** Biological and Life Sciences

Assessing potential biases in social media reports for monitoring of range expansion of black bears

American black bear (Ursus americanus) populations are recovering in Mississippi following near extirpation in 1932. Reports of Black Bear sightings have increased with population range expansion. The Mississippi Department of Wildlife, Fisheries, and Parks created and encourages the use of a Facebook group to monitor black bear sightings. Citizen science through social media can be a valuable source of information however, there can be biases that affect the accuracy of data and representation of the current black bear distribution. We used reports from the Mississippi Black Bears Facebook group from March 31, 2023- January 15, 2026, to tabulate sightings in different counties to investigate potential reporting biases in areas where Black Bear sightings are more or less common. We reduced multiple posts/person to 1 post/person in each county and tabulated reports as high, moderate, or low number of reports relative to average number of reports/county. We then tabulated counties based on designations related to expected occurrences of black bears based on a map from 2012 (frequent, occasional, and rare), and an updated map from 2024 (frequent and rare). We performed Chi-square tests to assess our hypothesis that reports would be biased low in counties with longer black bear presence and frequent occurrences, and biased high in counties where black bear occurrence is relatively novel. We found counties where bears were previously or currently considered rare had significantly fewer reports compared to counties where bears were considered frequent ($X2$= 15.311, df=4, p= 0.004 for comparison with 2012 county assignments; $X2$ = 19.297, df = 2, p < 0.001 for comparison with 2024 county assignments). Our findings were contrary to our expectations and indicate social media reporting accounting for individual poster bias may be a useful index for monitoring black bear range expansion in Mississippi.

#086 - Wilkins, Luke

Major: Biological Sciences - Bachelor of Science
Faculty Research Mentor: Nick Fitzkee, Chemistry
Co-Author(s): Tanveer Shaikh, Matthew Mansell, Tanveer Shaikh, Nicholas Fitzkee
Funding: NSF OIA 2414443, CBET 2405018 | **Project Category:** Physical Sciences

Orientation-Dependent Immune Recognition of Gold Nanoparticles Engineered with Complement C3d Cysteine Variants

Complement component C3d, a 35 kDa innate immune fragment, forms protein coronas on nanoparticle surfaces and mediates immune recognition through B cell co-receptor engagement. Understanding how C3d orientation on nanoparticles influences immune outcomes is essential for designing materials with predictable biological behavior. Here, we engineered three cysteine variants of C3d — E167C, Y273C, and P294C — intended to present different orientations upon covalent attachment to 15 nm gold nanoparticles (AuNPs). Recombinant variants were expressed with a His-tag, purified by affinity chromatography with thrombin cleavage at room temperature, and resolved under high-salt conditions (1 M NaCl) to maintain monomeric form, with SEC and SDS-PAGE confirming the expected 33 kDa molecular weight. Dynamic light scattering confirmed corona formation across all variants, with hydrodynamic diameters varying with orientation, indicating orientation-dependent surface presentation. Circular dichroism showed that secondary structure remains intact upon nanoparticle binding, with similar thermal melting temperatures across variants. Macrophage uptake experiments revealed notable orientation-dependent differences: AuNPs+Y273C exhibited the highest cellular internalization (~113 ppm Au), followed by P294C (~25 ppm) and E167C (~10 ppm), which had substantially lower uptake. Ongoing densitometry studies will further analyze the composition of the secondary corona. These results demonstrate that C3d orientation plays a crucial role in nanoparticle immune recognition.

#125 - Williams, Alexandra

Major: Political Science - Bachelor of Arts
Faculty Research Mentor: Dallas Breen, Stennis Inst of Govt and Comm Dev
Funding: None | **Project Category:** Humanities

From Chatter to Charter: How Eleanor Roosevelt Used Her Position as A Magazine Columnist to Promote Global Cooperation to the American Public

From 1941 until her death in 1962, First Lady Eleanor Roosevelt's "If You Ask Me" magazine column offered a distinctive platform for public dialogue on issues ranging from everyday etiquette to pressing matters of foreign policy. While existing scholarship often emphasizes Roosevelt's diplomatic work through formal institutions such as the United Nations, less attention has been paid to how she used popular media to shape public understanding of international cooperation. This paper addresses that gap by examining how Roosevelt leveraged her column to counter American skepticism toward global institutions and promote civic engagement in the postwar era. Through a close textual and historiographical analysis of selected columns spanning two decades, this study explores how Roosevelt framed complex geopolitical questions as extensions of her readers' everyday lives. By making foreign policy accessible through domestic language and moral reasoning, Roosevelt cultivated a sense of "global citizenship" rooted in empathy and informed participation. Ultimately, this research demonstrates that Roosevelt's approach anticipated modern strategies of public diplomacy by using accessible, personal communication to foster public trust and international awareness. Her work offers a powerful model for understanding how media can bridge domestic and global concerns, a lesson that remains strikingly relevant in today's digital age of political communication.

#077 - Williams, Blake

Major: Industrial Engineering - Bachelor of Science
Faculty Research Mentor: Jessica Gonzalez Vargas, Industrial and Systems Engineering
Co-Author(s): Daniel Hale, Katrina Poe-Johnson, Jessica Gonzalez Vargas
Funding: None | **Project Category:** Engineering

It is Not Just the Clock: How Perceived Wait Time Influences Patient Experience in a University Health Center

Hospital waiting times continue to rise, placing increasing strain on urgent care facilities and other outpatient resources, including student health centers on university campuses. Prior research suggests that patients' perception of waiting time, specifically the difference between expected and actual wait time, may be a stronger predictor of satisfaction than the actual duration itself. Although prolonged waits are undesirable, they are often associated with inefficiencies in care delivery, increased rates of patients leaving without being seen, and suboptimal resource allocation. To address these challenges, this study focuses on three primary aims: (1) to examine the relationship between perceived versus actual waiting time and patient satisfaction in a student health center, (2) to identify clinician and staff-reported factors contributing to waiting times, and (3) to evaluate multidimensional patient satisfaction following their visit. A within-subjects study design was conducted over a six-week period at a university student health center. To address the first aim, patients completed a brief questionnaire before, during, and after their visit to capture expected wait time, perceived wait time, and satisfaction. To address the second aim, clinicians, staff, and healthcare providers completed an online questionnaire regarding workflow processes and perceived contributors to delays. For the third aim, a multidimension post-visit satisfaction survey was automatically distributed to patients after their appointment. Although final analyses are ongoing, we anticipate that perceived waiting time, particularly discrepancies between expected and actual wait times, will be more strongly associated with patient satisfaction. We also expect to identify workflow-related factors and communication gaps that contribute to delays. We also expect that communication quality, perceived provider attentiveness, and transparency about delays will moderate the impact of waiting time on satisfaction. Ultimately, this study aims to provide actionable insights to improve patient experience, optimize operational efficiency, and inform targeted interventions within student health settings.

#298 - Williams, Candice

Major: Fashion Design & Merchandising - Bachelor of Science
Faculty Research Mentor: JuYoung Lee, School of Human Sciences
Co-Author(s): Minel Guler, Tess McIntire, Emma Murphree, Gabrielle Bridges, Laila Washington
Funding: None | **Project Category:** Biological and Life Sciences

Exploring the Effects of Branded Clothing on Self-Image and Self-Esteem in Teenage Girls

In exploring the effects of branded clothing on self-image and self-esteem in teenage girls, the positive correlation between self-image and self-esteem can be affected by clothing as it relates to socioeconomic status (income), which has a potentially mediating effect on development, and being able to afford better quality or branded clothing. Researchers have found that clothing and fashion play a significant role in adolescent self-image as well as psychological well-being, as clothing choices influence confidence, social belonging, and identity formation during this critical developmental stage (Nevtia & Monika, 2026). Teenage girls' self-image and self-esteem can be affected by clothing as it relates to socioeconomic status (income) and being able to afford better quality or branded clothing. The purpose of this research is to find trends and understand how teenage females use clothing as a form of expression of confidence within a socioeconomic context. Objectively, this research focuses on collecting and analyzing data both qualitatively and quantitatively, and comparing the meaning of clothing and how it helps with personality assertion. Additionally, exploration of clothing functions as a form of symbolic expression and influences self-esteem and self-image among teenage girls, and how this differs or remains similar across differing socioeconomic statuses take place during the research process. Utilizing Qualtrics, we will conduct an online survey distributed to female college students researching the effects of branded clothing on self-image and self-esteem during their adolescence. Upon completion of this research, we will perform a regression analysis concluding our findings.

#299 - Williams, Chiara

Major: Agronomy - Bachelor of Science
University: Mississippi State University
Faculty Research Mentor: Shien Lu, Agricultural Science & Plant Protec
Co-Author(s): Lindsey Robinson, Ehtasham Ali, Lindsey Robinson, Shien Lu
Funding: Mississippi Soybean Promotion Board | **Project Category:** Biological and Life Sciences

Characterization of Antimicrobial Bacteria Isolated from Soybean Fields Affected by Charcoal Rot

Charcoal rot, caused by the fungal pathogen Macrophomina phaseolina, is a major disease limiting soybean production. Biologically based biofungicides are increasingly sought for sustainable agriculture. The objective of this study was to isolate and characterize bacteria from asymptomatic soybean plants growing within charcoal rot–affected field patches and to evaluate their antimicrobial potential. Bacterial isolates (CW1, CW5, EA76, & EA74) were obtained from field samples and screened for antimicrobial activity against plant pathogens Geotrichum candidum and Erwinia amylovora using plate bioassays. The isolates were further characterized through PCR amplification of the 16S rDNA gene. PCR products were sequenced and analyzed to determine the taxonomic identity of the isolates. Sequence data were used to construct a phylogenetic tree to examine relationships among the collected isolates and reference bacterial species. Results indicate that the isolates belong to the bacterial genera Bacillus, Burkholderia, Streptomycetes, and Pseudomonas. The isolates exhibited variation in antimicrobial activity, suggesting differences in their capacity to inhibit microbial growth. Ongoing studies aim to further resolve their taxonomic identities and evaluate their antimicrobial activity against common plant pathogens. These findings improve our understanding of microbial interactions in diseased soybean fields and may help identify bacteria with potential applications in biological control for plant disease management.

#097 - Williams, Miles

Major: Architecture - Bachelor of Architecture
Faculty Research Mentor: Jacob Gines, FWRC-Sustainable Bioproducts
Funding: Method Studio Undergraduate Research Fellowship | **Project Category:** Arts, Music, & Design

The Market Value of Mass Timber: Comparative Leasing and Occupancy Performance of Mass Timber and Conventional Class A Office Buildings

The growth of mass timber construction (MTC) in the United States has accelerated due to its demonstrated sustainability, structural performance, and construction efficiencies. However, limited research has evaluated its leasing performance relative to conventionally constructed office buildings. This study analyzes nine Class A mass timber office buildings across U.S. markets, comparing their asking rents and occupancy rates to equivalent Class A buildings within the same submarkets. Data was collected on lease rates, occupancy, and submarket benchmarks. Results indicate that mass timber buildings achieve an average rental premium of 51.97% above submarket lows, 1.44% above submarket highs, and 19.12% above the submarket mean. Occupancy rates averaged 13.28% higher than submarket averages. By quantifying lease and occupancy differentials, this research contributes needed empirical evidence to an underexamined area and provides market insight for developers, investors, contractors, and architects evaluating the financial performance of mass timber office construction.

#078 - Wilson, Jacob

Major: Computer Science - Bachelor of Science
Faculty Research Mentor: Jingdao Chen, Computer Science and Engineering
Funding: None | **Project Category:** Engineering

Embarassingly Recurrent

Standard sequence models are designed to converge — to resolve ambiguity, commit to representations, and produce outputs that reflect a settled internal state. This work challenges that design assumption. I investigate a class of recurrent architectures, built on the Perceiver framework, in which the internal state is deliberately prevented from converging to a fixed point. Instead, the model maintains persistent, bounded dynamical activity — orbiting an attractor rather than collapsing into one. The central hypothesis is that convergence and intelligence are not synonymous. When a model commits to a fixed internal state, it forfeits representational entropy that may be computationally valuable — particularly for tasks requiring sustained ambiguity, multi-hypothesis reasoning, or sensitivity to subtle distributional shifts. By designing recurrence that asymptotically approaches but never reaches equilibrium, the system preserves this entropy across arbitrary depth. I find that this regime gives rise to emergent properties absent in convergent counterparts. The model develops phase-sensitive internal representations, where the timing of a readout relative to the internal trajectory encodes distinct semantic content. Competitive dynamics between inconsistent associations emerge naturally, allowing the model to maintain tension between interpretations rather than prematurely resolving them. Perhaps most surprisingly, the system exhibits adaptive compute allocation — allocating more internal recurrence to inputs that resist resolution, without any explicit supervision over depth. I term this property embarrassingly recurrent — a deliberate echo of embarrassingly parallel — suggesting that intelligence itself may be nothing more than entropy that refuses to settle, and that maintaining it indefinitely is, embarrassingly, just a matter of never stopping. Ongoing work focuses on characterizing what classes of problems benefit most from sustained entropy and whether convergence can be made a learned, input-conditioned behavior rather than an architectural inevitability.

#300 - Wise, Kari

Major: Wildlife, Fisheries & Aqua - Bachelor of Science
Faculty Research Mentor: Chris Ayers, FWRC - Wildlife, Fisheries & Aquaculture
Co-Author(s): Travis Carpenter, Becky Rosamond
Funding: Career Center and CFR URSP | **Project Category:** Biological and Life Sciences

Wood Duck Ecology on the Sam D. Hamilton Noxubee Wildlife Refuge

Monitoring wildlife populations is an important part of conservation to detect any changes or concerning trends. Understanding where animals are improves our ability to catch them and track their movements. In this study, we monitored, captured, banded, and released Wood Ducks (Aix sponsa) on the Sam D. Hamilton Noxubee National Wildlife Refuge from June to September 2025 to estimate the resident population and observe limiting factors. Five sites were selected, with one yielding two successful capture attempts. The North Levee site showed increased Wood Duck activity in late summer, resulting in the capture and banding of 14 birds (Wood Ducks and Black-bellied Whistling-Ducks (Dendrocygna autumnalis)) over two attempts. Camera data analysis revealed an average of 6.8 Wood Ducks per photo compared to 11 Black-bellied Whistling-Ducks, suggesting a potential correlation between Black-bellied Whistling-Duck presence and decreased Wood Duck numbers. Future research should focus on expanding camera coverage, exploring early capture and transmitter deployment, and potentially further investigating the impact of Black-Bellied Whistling-Ducks on the Wood Duck population.

#186 - Witt, Hailey

Major: Psychology - Bachelor of Arts
Faculty Research Mentor: Cliff McKinney, Psychology
Funding: None | **Project Category:** Social Sciences

Relation Between Body Self-Esteem and Negative Maternal Feedback: Moderation by Media Influences

Body self-esteem is influenced by social factors such as parental feedback and media exposure. The current study examined whether negative maternal feedback was associated with body self-esteem and whether media influences moderated this relationship. Participants included 567 emerging adults aged from 18 to 22 years (M = 18.57, SD = 0.94). A moderation analysis was conducted using PROCESS 4.2 (Hayes, 2022), which indicated that negative maternal feedback was significantly associated with lower body self-esteem (B = -.21, p< .001). The interaction between maternal feedback and media influences was significant (B = -.02, p =.004), indicating that media influences moderated the relationship between negative maternal feedback and body self-esteem. These findings suggest that both maternal feedback and media influences play important roles in shaping body self-esteem among emerging adults.

#079 - Woodberry, Toni

Major: Computer Engineering - Bachelor of Science
Faculty Research Mentor: Daniel Carruth, CAVS Research
Co-Author(s): Chris Goodin
Funding: ORED Undergraduate Research Program | **Project Category:** Engineering

Design and Integration of a Map-Based Planning Framework in ROS for Enhanced Global and Local Path Planning in Autonomous Vehicle Systems.

This research develops and implements a structured mapping integration framework within the ROS-based autonomous vehicle platform at the Center for Advanced Vehicular Systems (CAVS) to improve navigation efficiency and operational consistency. Autonomous vehicle performance depends not only on real-time sensor data but also on reliable environmental representation. To address this need, this project focuses on incorporating high-quality map data into the CAVS system to strengthen path planning capabilities. The primary objective of this work is to design and integrate mapping capabilities that support robust global and local path planning within the ROS framework. By incorporating structured map data, the system can generate globally optimal routes while enabling

more informed and efficient local trajectory planning around obstacles and environmental constraints. The integrated mapping framework will enhance route consistency and improve path feasibility across different testing scenarios. To evaluate and validate the mapping implementation, data streams and vehicle states are visualized using Foxglove, a real-time robotics visualization tool that interfaces with ROS topics. This visualization process supports debugging, verification of map alignment, and analysis of vehicle behavior relative to planned paths. Monitoring system outputs in Foxglove ensures accurate synchronization between mapping data, localization estimates, and control commands. The central takeaway of this research is that effective map integration within a ROS-based autonomous architecture significantly enhances navigation stability, system robustness, and overall vehicle performance at CAVS.

#187 - Wright, Anna-Claire

Major: Educational Psychology - Bachelor of Science
Faculty Research Mentor: Kasia Gallo, CounselHEdEdPsyFound (CHEF)
Funding: None | **Project Category:** Social Sciences

Social and Emotional Learning is a Necessity, Not a Luxury

Social and Emotional Learning (SEL) gained traction during COVID, as schools sought new ways to support both the students and the teachers. SEL is the process of learning how to understand and manage one's emotions, build positive relationships with others, make good decisions, and handle challenges in a healthy way. It helps people, especially children, develop skills like empathy, self-awareness, and self-regulation, which are important for success in school, work, and life. The purpose of this study was to examine the positive effects of SEL on students' overall development. This study reviewed fifteen empirical studies examining social and emotional learning across different age groups and implementation styles, including story time for younger children and structured lessons for older students. Collectively the results indicate that including social and emotional learning in school systems enhances learning outcomes, fosters positive development, supports personal growth, and builds essential foundational skills. Prioritizing SEL creates supportive environments in which students thrive academically, socially, and emotionally.

#114 - Wynn, Jalynn

Major: Learn & User Experience Design - Bachelor of Science
Faculty Research Mentor: Dana AlZoubi, Dept of Techn, Leadership, & Design
Co-Author(s): Eden Reed
Funding: NSF Grant | **Project Category:** Education

Human-Centered Design of CeLens: Bridging Informal Construction Observations and Formal Engineering Learning

Construction site observations often fail to translate into meaningful conceptual understanding for engineering students due to limited guidance, time constraints, and inconsistent access to experts. To address this gap, CeLens (Construction Engineering Lens) was developed as an AI enhanced mobile learning platform grounded in Human Centered Design (HCD). CeLens functions as an on demand construction engineering assistant, helping students interpret real world construction environments through guided observation, AI supported questioning, embedded quizzes, and connections to course materials. The system aims to bridge informal everyday exposure to construction projects with structured academic learning. The development process followed four HCD phases including Empathize, Define, Ideate, and Prototype. Student feedback identified the need for immediate clarification, structured scaffolding, and simplified navigation during active site experiences. These insights informed the creation of low-fidelity paper prototypes, which evolved into high-fidelity Figma interfaces emphasizing visual hierarchy, reduced cognitive load, and conversational AI support. By integrating attention guidance, explanation, reflection, and reinforcement within authentic contexts, CeLens demonstrates how AI can be responsibly designed to support experiential learning and connect real world observation with formal engineering instruction.

#188 - Zhou, Kallen

Major: Economics - A&S - Bachelor of Arts
Faculty Research Mentor: Chris Snyder, Shackouls Honors College
Funding: Shackouls Honors College Research Fellowship | **Project Category:** Social Sciences

Rural Overhead: A Quantitative and Theoretical Framework for Administrative Cost Growth

Current literature on rural higher education institutions (HEIs) acknowledges the role they play in their communities, providing post-secondary education access and contributions to their local economies. Additionally, administrative bloat has been commonly defined as the increase in non-instructional spending. However, these analyses rarely considered how rurality can affect administrative bloat. Applying economic theories such as Resource Dependency Theory and diseconomies of scale, this study pairs a theoretical framework with quantitative analyses to investigate whether rural HEIs face larger growth in their administrative spending compared to their urban counterparts. Using IPEDS panel data (2006–2023), inflation-adjusted administrative spending per student, and a rural/urban classification based on IPEDS locale codes, this study combines descriptive comparisons, Welch's unequal-variance t-tests, and a comparative interrupted time series design around the year 2011, a major federal compliance inflection point for higher education. The results indicate a statistically significant post-2011 rural-relative slope increase of approximately $174 per student per year in administrative spending compared to urban institutions ($p = 0.033$), indicating rural HEIs may face greater administrative bloat following heightened compliance demands. These findings suggest that rural HEIs may face disproportionate financial strain which could crowd out student investments and community engagement.

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Special thanks to the Faculty Mentors, Associate Deans for Research, the symposium evaluators & Special Area Competition hosts and judges, the college communications offices, and the staff and students within ORED & URCD.

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