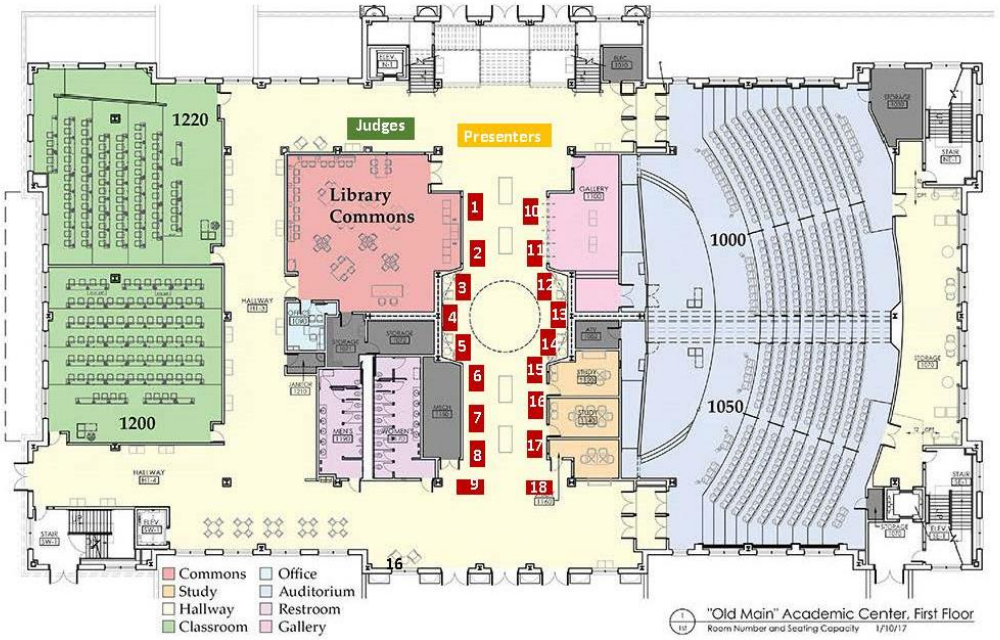
SPRING 2023 GRADUATE STUDENT RESEARCH SYMPOSIUM

POSTER AND ORAL PRESENTATIONS

Saturday, February 25, 2023
8 AM to 3 PM
Old Main Academic Center

MISSISSIPPI STATE UNIVERSITY
GRADUATE STUDENT ASSOCIATION

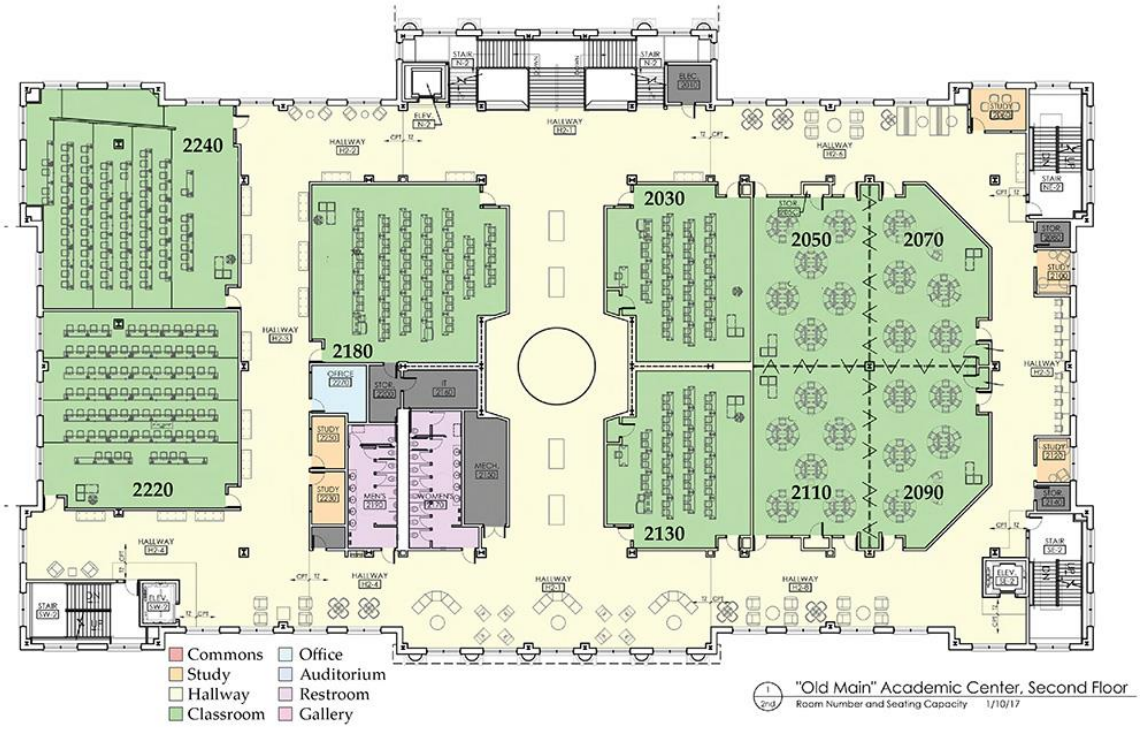
MISSISSIPPI STATE UNIVERSITY
THE GRADUATE SCHOOL



SIGN IN STUDENTS

SIGN IN JUDGES

Poster Presentations



*Oral presentations will take place on the 1st and 2nd floor of Old Main

*All poster presentations will take place on the 1st floor of Old Main

Session	Location	Time
AM Poster 1	1st Floor Lobby	8 AM – 10 AM
AM Poster 2	1st Floor Lobby	8 AM – 10 AM
AM Poster 3	1st Floor Lobby	10:00 AM – 12 PM
AM Poster 4	1st Floor Lobby	10:00 AM – 12 PM
AM Oral 1	Room 1220	8 AM – 9 AM
AM Oral 2	Room 1200	8 AM – 9 AM
AM Oral 3	Room 2180	8 AM – 9:15 AM
AM Oral 4	Room 2240	8 AM – 9 AM
AM Oral 5	Room 1200	9:30 AM – 10:30 AM
AM Oral 6	Room 1220	10 AM – 11 AM
AM Oral 7	Room 2240	10 AM – 11 AM
AM Oral 8	Room 2180	10 AM – 11 AM
AM Oral 9	Room 1200	11 AM – 12 PM
AM Oral 10	Room 2130	11:15 AM – 12 PM
PM Poster 1	1st Floor Lobby	1 PM – 3 PM
PM Poster 2	1st Floor Lobby	1 PM – 3 PM
PM Oral 1	Room 2130	1 PM – 1:30 PM
PM Oral 2	Room 1200	1 PM – 2 PM
PM Oral 3	Room 1220	1:30 PM – 3 PM
PM Oral 4	Room 2180	2 PM – 3 PM

MORNING SESSION

Poster Session 1
8:00 AM – 10:00 AM
OMAC 1st Floor Lobby – Poster 1 - 8

Moderator:
Jeremy Montgomery

Evaluators:
1. Dr. Li Zhang, Poultry Science
2. Dr. Raju Bheemanahalli, Plant and Soil Sciences

Participants:
1. Vivek Venishetty, Agriculture and Life Sciences, *Assessment of BMPs by estimating Hydrologic and Water Quality outputs using SWAT in Yazoo River Watershed*
2. Faith Henson, Agriculture and Life Sciences, *Influence of biochar and poultry litter treatment (PLT) on broiler litter Escherichia coli populations and antimicrobial-resistance genes during a live grow-out.*
3. Kenisha Gordon, Agriculture and Life Sciences, *Efficacy of Chitosan on Quality and Shelf life of Goat Meat Patties*
4. Hunter Blalock, Agriculture and Life Sciences, *Insecticide Application Efficacy of sUAS as Compared to Traditional Delivery Systems*
5. Zonia Elizabeth Caro Carvajal, Agriculture and Life Sciences, *Microgreen production: Impact of sanitization methods on germination percentage and mold suppression on Allium porrum L. seeds*
6. Praveen Gajula, Agriculture and Life Sciences, *Evaluating the impact of biostimulants at variable nitrogen rates in Mississippi corn production systems*
7. Ranadheer Reddy Vennam, Agriculture and Life Sciences, *Corn silk dynamics to soil moisture deficit and its impact on yield*
8. Josey Webb, Agriculture and Life Sciences, *Plugging into a new age: the impact of social media use on undergraduate students' perceptions of production agriculture and consumer decisions*

Poster Session 2
8:00 AM – 10:00 AM
OMAC 1st Floor Lobby – Posters 10 - 18

Moderator:
Jeremy Montgomery

Evaluators:
1. Dr. Deborah Lee, MSU Libraries
2. Dr. Sheida Riahi, Marketing, Quantitative Analysis, and Business Law
3. Dr. Sanna King, Sociology
4. Dr. Iva Ballard, Marketing, Quantitative Analysis, and Business Law
5. Dr. James Kelley, Meridian Division of Arts & Science
6. Dr. KC New, MSU Libraries

Participants:
1. Moshood Fagbolade, Education, Arts and Sciences, and Business, *A genetic complementation approach examining occidiofungin targeting of fungal actin orthologs using the S. cerevisiae shuffle strategy*
2. Chathuri Peiris, Education, Arts and Sciences, and Business, *Comparisons of Biochar-supported Iron Nanoparticle Composites Synthesized from Carbothermal and Borohydride Reductions.*
3. Brooke Paben, Education, Arts and Sciences, and Business, *Count Your Chews! A Self-Monitoring Intervention to Increase Chewing Efficiency*
4. Rita Druffner, Education, Arts and Sciences, and Business, *A Systematic Review of Function-Based Interventions for Students with Emotional Behavior Disorders: Preliminary Results*
5. Jacie Rinehart, Education, Arts and Sciences, and Business, *Teaching Students with Autism Spectrum Disorder Receptive and Expressive Money Skills*
6. Mallie Donald, Education, Arts and Sciences, and Business, *Stimulus Fading to Enhance College Building Recognition*
7. Andi Durham, Education, Arts and Sciences, and Business, *Indirect Effects of Parental Religiosity on Emerging Adult Risky Sexual Behavior via Family Functioning*
8. Abdullah Abu Anzeh, Education, Arts and Sciences, and Business, *Catalytic Hydroborylative Coupling of Allenes for Chemo-, Regio- and Stereoselective Synthesis of Tetrasubstituted 1,3-Diene Compounds*
9. Jillian Ressler, Education, Arts and Sciences, and Business, *Using a Brief Experimental Analysis to Determine an Effective Reading Intervention*

Poster Session 3
10:00 AM – 12:00 PM
OMAC 1st Floor Lobby – Posters 1 -6

Moderator:
Jeremy Montgomery

Evaluators:
1. Dr. Seunghan Lee, Industrial and Systems Engineering
2. Dr. Wenmeng Tian, Industrial & Systems Engineering

Participants:
1. M M Nabi, Engineering, *Deep-learning based Global Soil Moisture estimation using CYGNSS Delay Doppler Maps*
2. Timothy Sellers, Engineering, *Graph-Based Path Planning for Autonomous Vehicles with Obstacle Fusion*
3. David Failla Jr., Engineering, *A Numerical Approach to Predicting the Effects of Spatial Gradation in Lattice Structures*
4. J. Logan Betts, Engineering, *Preliminary development of a high-throughput approach to calibrate finite element heat sources for wire arc additive manufacturing*
5. Matthew Register, Engineering, *Effects on residual stress due to thermal property input of low carbon steel in finite element modeling of the WAAM process*
6. Swayamjit Saha, Engineering, *Comprehensive Wind Speed Prediction-Based Analysis of Stacked Stateful & Stateless Neural Network Models*

Poster Session 4
10:00 AM – 12:00 PM
OMAC 1st Floor Lobby – Posters 7 - 10

Moderator:
Jeremy Montgomery

Evaluators:
1. Dr. Mostafa Mohammadabadi, Sustainable Bioproducts
2. Dr. Ashley Schulz, Forestry

Participants:
1. Gabriel Nyen, Forest Resources and Veterinary Medicine, *Silvicultural strategies for converting longleaf pine plantations to multi-aged longleaf pine stands*
2. Darren Shoemaker, Forest Resources and Veterinary Medicine, *Vulnerability of reservoir fish habitats to climate change*
3. Madalyn Stoecker, Forest Resources and Veterinary Medicine, *Forest Structure and Edge Effects on Bee Functional Diversity in Working Pine Forests*
4. Macy Gosselaar, Forest Resources and Veterinary Medicine, *Impact of Differentially Expressed Genes in Monoclonal and Polyclonal Plantings of Populus deltoides for Agricultural Nitrogen Mitigation*

Oral Session 1
8 AM – 9 AM
Room OMAC 1220

Moderator:
Durant Fullington

Evaluators:
1. Dr. Galen Collins, Biochemistry, Molecular Biology, Entomology & Plant Pathogenesis
2. Dr. Matt Griffin, Pathobiology and Population Medicine

Participants:
1. Ian Sartorio, Forest Resources and Veterinary Medicine, *Land cover change versus salvage logging: proxies and predictions after hurricane disturbances*
2. Roberto Kimura, Forest Resources and Veterinary Medicine, *Vertical integration and land cover change: a case study of the Brazilian pulp industry*
3. Sakar Nepal, Forest Resources and Veterinary Medicine, *THE IMPORTANCE OF FOREST RESOURCE DEVELOPMENT PROGRAM TO FOREST INVESTMENT*
4. Macy Gosselaar, Forest Resources and Veterinary Medicine, *Impact of Differentially Expressed Genes in Monoclonal and Polyclonal Plantings of Populus deltoides for Agricultural Nitrogen Mitigation*

Oral Session 2
8 AM – 9 AM
Room OMAC 1200

Moderator:
Adrian Spears

Evaluators:
1. Dr. Shankar Ganapathi Shanmugam, Institute for Genomics, Biocomputing & Biotechnology
2. Dr. Linan Jia, Poultry Science

Participants:
1. Sabina Regmi, Agriculture and Life Sciences, *Meta-analysis of Consumers' willingness to pay for broadband*
2. Molly Friend, Agriculture and Life Sciences, *Physiology of human-horse coupling: Horses reflect cortisol concentrations in residential substance abuse treatment program patients experiencing withdrawal while participating in equine interaction*
3. Timothy Sellers, Agriculture and Life Sciences, *Deep Learning-based Heterogeneous System for Autonomous Navigation*
4. Sawyer Hopkins, Agriculture and Life Sciences, *Efficacy of Insect Growth Regulators on Lepidopteran Pest of Soybean*

Oral Session 3
8 AM – 9:15 AM
Room OMAC 2180

Moderator:
Mercy Ogunruku

Evaluators:
1. Dr. Lu He, Marketing, Quantitative Analysis, and Business Law
2. Dr. Meg Marquardt, English and Science Communication
3. Dr. Nazanin Morshedlou, Industrial and Systems Engineering

Participants:
1. Abdullah Al Mamun, Engineering, *Vibro-acoustics sensor fusion for in-situ bearing fault diagnosis by frequency-domain multilinear principal component analysis*
2. Abdur Rahman, Engineering, *An Interpretable Deep Learning Model for Wood Chip Moisture Content Prediction*
3. Ayantha Senanayaka, Engineering, *Rapid Porosity Prediction of Additive Manufacturing under Different Process Conditions*
4. Brad Sampson, Engineering, *Mechanical Characterization of Functionally Graded Cellular Structures*
5. *Yukai Ai, Engineering, Optical-trapping, single-particle reactor for the study of heterogeneous chemistry*

Oral Session 4
8 AM – 9 AM
Room OMAC 2240

Moderator:
Amoni Washington

Evaluators:
1. Dr. Mohit Verma, Institute for Genomics, Biocomputing & Biotechnology
2. Dr. Tim Boltz, Poultry Science

Participants:
1. Urita Agana, Agriculture and Life Sciences, *Multi Stressor Impacts on Honey Bee Physiology and Gut Microbiome*
2. Alexis Jackson, Agriculture and Life Sciences, *Preparing Colleges and Advisors for the Influx of Mental Illness Experienced by Students*
3. Oluwaseyi Olomitutu, Agriculture and Life Sciences, *How fast can we plant soybean in Mississippi?*
4. Melika Kooshki Forooshani, Agriculture and Life Sciences, *Rural Mississippians' perceptions of primary healthcare trustworthiness when dealing with a mental health challenge: Age, gender, and racial differences*

Oral Session 5
9:30 AM - 10:30 AM
Room OMAC 1200

Moderator:
Kamillah Scales

Evaluators:
1. Dr. Shankar Ganapathi Shanmugam, Institute for Genomics, Biocomputing & Biotechnology
2. Dr. Linan Jia, Poultry Science
3. Dr. Tim Boltz, Poultry Science

Participants:
1. Amandeep Kaur, Agriculture and Life Sciences, *Proteomic Analysis in Chloroplasts of soybean (Glycine max L.) under Silicon supplementation and drought Stress*
2. Sadikshya Poudel, Agriculture and Life Sciences, *Elucidating the impacts of drought stress during pod development in soybeans*
3. Bikash Adhikari, Agriculture and Life Sciences, *Response of lettuce (Lactuca sativa L.) to salt stress*
4. Carson Roberts, Agriculture and Life Sciences, *Cover Crops Can Reduce Irrigation Water Use in Cotton*

Oral Session 6
10 AM – 11 AM
Room OMAC 1220

Moderator:
Chat Rathnamalala

Evaluators:
1. Dr. Galen Collins, Biochemistry, Molecular Biology, Entomology & Plant Pathogenesis
2. Dr. Matt Griffin, Pathobiology and Population Medicine

Participants:
1. Divya Rose, Forest Resources and Veterinary Medicine, *Analysis of microbial community diversity in channel catfish ponds : A comprehensive study from 'The Delta'*
2. Sujita Balami, Forest Resources and Veterinary Medicine, *Streptococcus dysgalactiae subsp. dysgalactiae From Farm-raised Channel Catfish In Mississippi, USA*
3. Franklin Quin, Jr., Forest Resources and Veterinary Medicine, *Structural Performance of the Post-To-Rail Connectors in a Hardwood Stairway HandRail Guard*
4. Suchana Aryal, Forest Resources and Veterinary Medicine, *STAND-LEVEL VARIABLE-DENSITY YIELD EQUATIONS FOR OAK-GUM-CYPRESS BOTTOMLAND HARDWWOD FORESTS*

Oral Session 7
10 AM – 11 AM
Room OMAC 2240

Moderator:
Amoni Washington

Evaluators:
1. Dr. Sanghwa Park, Physics
2. Dr. Sarah Lalk, Geosciences
3. Dr. Rinat Gabitov, Geosciences

Participants:
1. Dharani Matharage, Education, Arts and Sciences, and Business, *Variation in Intra-Chromosomal Patterns of Recombination Rate between Wild-Derived Populations of Caenorhabditis elegans*
2. Rabina Kumpakha, Education, Arts and Sciences, and Business, *Efficacy of antifungal compound occidiofungin against mature biofilm by Candida species*
3. Arma Regmi, Education, Arts and Sciences, and Business, *Electropolymerization of Trifluorovinyl Ether (TFVE) Based Monomers*
4. Binod Regmi, Education, Arts and Sciences, and Business, *Probing High Quantum Oscillation Frequency from the Reconstructed Fermi Surface of Kagome Superconductor KV3Sb5: Theoretical Explorations*

Oral Session 8
10 AM – 11 AM
Room OMAC 2180

Moderator:
Christiana Eziashi

Evaluators:
1. Dr. Lu He, Marketing, Quantitative Analysis, and Business Law
2. Dr. Meg Marquardt, English and Science Communication

Participants:
1. Humayun Ahmad, Engineering, *Highly stretchable conducting coaxial P3HT composite fiber*
2. James Huston Rogers III, Engineering, *Evaluating Graph-Based Multi-Waypoint Optimization with Node Selection*
3. Walaa Alqwider, Engineering, *SOFTWARE RADIO TESTBED FOR 5G AND L-BAND RADIOMETER COEXISTENCE RESEARCH*
4. Luke Jackson Tucker, Engineering, *Chitosan hydrogel and poly lactic acid particles loaded with fosfomycin for localized treatment of osteomyelitis*

Oral Session 9
11 AM – 12 PM
Room OMAC 1200

Moderator:
Durant Fullington

Evaluators:
1. Dr. Shankar Ganapathi Shanmugam, Institute for Genomics, Biocomputing & Biotechnology
2. Dr. Linan Jia, Poultry Science
3. Dr. Tim Boltz, Poultry Science

Participants:
1. Durga Purushotham Mahesh Chinthalapudi, Agriculture and Life Sciences, *Exploring the Impacts of Cover Crops on Soil Health and Bacterial Community Abundance and Diversity in Corn Production Systems*
2. Praveen Gajula, Agriculture and Life Sciences, *Impact of biostimulants at variable nitrogen rates in Mississippi corn production systems*
3. Josey Webb, Agriculture and Life Sciences, *Is Agriculture Being Implemented in Private School Classrooms? The Impact of Teacher Willingness and Availability of Resources.*
4. Ramandeep Kumar Sharma, Agriculture and Life Sciences, *Crop-climate interactions in corn, rice, and wheat: Southeastern USA*

Oral Session 10
11:15 AM – 12 PM
Room OMAC 2130

Moderator:
Adrian Spears

Evaluators:
1. Dr. Hilary DeShong, Psychology
2. Dr. Mary Dozier, Psychology

Participants:
1. Orlandria D. Beamon, Education, Arts and Sciences, and Business, *Using Antecedent Interventions to Increase Oral Reading Fluency*
2. Nathan Smith, Education, Arts and Sciences, and Business, *"Laboring from Sea Castle to Brava Centauri: Work on Display at Disney's Future City in the 1980s"*
3. Cliff Thames, Education, Arts and Sciences, and Business, *The impact of extracurricular activities on adolescents from high-poverty vs. low-poverty areas and their perception of the influence on their development*

AFTERNOON SESSION

Poster Session 1
1:00 PM – 3:00 PM
OMAC 1st Floor Lobby – Posters 1 - 9

Moderator:
Michael Carroll

Evaluators:
1. Dr. Vitor Martins, Agricultural and Biological Engineering
2. Dr. Thiago Martins, Animal and Dairy Science

Participants:
1. Notsile Dlamini, Agriculture and Life Sciences, *Profiling boar semen quality through near-infrared spectroscopy and proteomic tools*
2. James Huston Rogers III, Agriculture and Life Sciences, *Evaluating Graph-Based Multi-Waypoint Optimization with Node Selection*
3. Bennett R. Pope, Agriculture and Life Sciences, *The Association Between Hispanic Men's Food Insecurity and Oral Health*
4. Sadikshya Poudel, Agriculture and Life Sciences, *Characterization of Southern United States soybean cultivars for heat and drought stress tolerance*
5. Bikash Adhikari, Agriculture and Life Sciences, *Seed priming attenuates salt stress impact and improves yield in lettuce*
6. Durga Purushotham Mahesh Chinthalapudi, Agriculture and Life Sciences, *Investigating the Effects of Cover Crops on Soil Microbial Communities and N availability in Corn Production Systems*
7. Ramandeep Kumar Sharma, Agriculture and Life Sciences, *Crop-climate interactions in corn, rice, and wheat: Southeastern USA*
8. Josey Webb, Agriculture and Life Sciences, *Who wants to bring agriculture into their classrooms? An online professional development program.*
9. Patricia Marie Cordero-Irizarry, Agriculture and Life Sciences, *Cool Learning Needs Clear Expectations!*

Poster Session 2
1:00 PM – 3:00 PM
OMAC 1st Floor Lobby – Poster 9 - 17

Moderator:
Michael Carroll

Evaluators:
1. Dr. Chaomin Luo, Electrical and Computer Engineering
2. Dr. Kayla Bates-Brantley, Counseling, Educational Psychology and Foundations
3. Dr. Beth Peterman, Pathobiology and Population Medicine
4. Dr. Gwendolyn D Boyd, Sustainable Bioproducts

Participants:
1. Gwendolyn Williams, Education, Arts and Sciences, and Business, *The Experiences of Ex-offenders with Disabilities- Implications for Vocational Rehabilitation: A literature Review*
2. Michaela Patoilo, M.S., Education, Arts and Sciences, and Business, *Head Injury and Executive Functioning in the MIDUS Cohort*
3. Robert E. Calabrese, Engineering, *Effects of Droplet Size and Dispersion Homogeneity on the Dielectric Integrity of Liquid Metal Polymer Composites*
4. Ethan Schuetzle, Engineering, *"Determination of Correction Factors for Measured Real Time Particle Mass Distributions"*
5. Patrick Camacho, Engineering, *Simulation-based comparison of the electromagnetic response of a laminar and heterogeneous multi-phase material*
6. Will McKelvey, Engineering, *Characterization of Transport Losses in an Aerosol Sampling Train*
7. Suchana Aryal, Forest Resources and Veterinary Medicine, *ESTIMATING ABOVEGROUND CARBON STOCK AND SEQUESTRATION POTENTIAL OF OAK-GUM-CYPRESS FOREST IN BOTTOMLAND HARDWOOD SITES*
8. Sakar Nepal, Forest Resources and Veterinary Medicine, *MISSISSIPPI'S TIMBER SEVERANCE TAX AND IT'S CONTRIBUTION TO THE ECONOMY*
9. Hafez Ahmad, Forest Resources and Veterinary Medicine, *Assessing the Relationship between Hydrological Connectivity and Fish Assemblage in the Mississippi Alluvial Valley Floodplain*

Oral Session 1
1:00 PM – 1:30 PM
Room OMAC 2130

Moderator:
Jeremy Montgomery

Evaluators:
1. Dr. Erika Womack, Mississippi State Chemical Laboratory
2. Dr. Saman Fatemi, Poultry Science

Participants:
1. Kevin Braman, Agriculture and Life Sciences, *Evaluation of time budgets and vaginal temperature of lactating Holstein cows offered a choice of shade and sprinklers on pasture*
2. Ranadheer Reddy Vennam, Agriculture and Life Sciences, *Assessment of drought stress impacts on flowering and grain filling stages of corn*

Oral Session 2
1:00 PM – 2:00 PM
Room OMAC 1200

Moderator:
Melissa Luckett

Evaluators:
1. Dr. Jean M Feugang, Animal and Dairy Sciences
2. Dr. Laya Khademibami, Sustainable Bioproducts

Participants:
1. Htet Lin Naing, Forest Resources and Veterinary Medicine, *Calculating Neighborhood Competition of Trees in Pacific Northwest Coast Range by Using the Dendrochronological Data*
2. Mateus Sanquetta, Forest Resources and Veterinary Medicine, *Modeling and forecasting pine sawtimber stumpage prices in southern US*
3. Nasir Qadir, Forest Resources and Veterinary Medicine, *An optimization model for assessing the impact of carbon offset programs in timberland assets*
4. Alhassan Ibrahim, Forest Resources and Veterinary Medicine, *Production, Characterization, and Upgrading of Fast Pyrolysis Bio-oil From Rice Straw Feedstock*

Oral Session 3
1:30 PM – 3:00 PM
Room OMAC 1220

Moderator:
Dakota Sullivan

Evaluators:
1. Dr. Jason Keith, College of Engineering
2. Dr. Kay Rand Morgan, Instructional Systems and Workforce Development
3. Dr. Meg Marquardt, English and Science Communication

Participants:
1. Phong Phan, Engineering, *Electroencephalography and biomechanics of the basketball free throw*
2. *Anh Vo, Engineering, Neuronal Membrane Deformation under Different Traumatic Brain Injury Scenarios*
3. Riku Kikuta, Engineering, *Risk Assessment and Modeling of Driver with pedestrian using Risk Potential Theory*
4. Simegnew Yihunie Alaba, Engineering, *WabileNet: Wavelet-Based Lightweight Feature Extraction Network*
5. Shaylin Williams, Engineering, *Summer Bridge and Beyond: Examining Freshmen and Continuing Students' Experiences*
6. Mahathir Mohammad Bappy, Engineering, *Evaluation of Design Information Disclosure through Thermal Feature Extraction in Metal based Additive Manufacturing*

Oral Session 4
2:00 PM – 3:00 PM
Room OMAC 2180

Moderator:
Macy Gosselaar

Evaluators:
1. Dr. Chinju Paul, Management and Information Systems
2. Dr. Mehdi Ghahremani, Counseling, Educational Psychology, and Foundations
3. Dr. Yueran Zhuo, Marketing, Quantitative Analysis, and Business Law

Participants:
1. Maitreyee Rawat, Education, Arts and Sciences, and Business, *Synthesis, Characterization of achiral and chiral CCC-NHC-Ir(III) pincer complexes for C-H functionalization of Indoles with Diazoacetates*
2. Amanda Mayo, Education, Arts and Sciences, and Business, *Effectiveness of Omeka Virtual Collections for Engaging Dunn-Seiler Museum Audiences*
3. Loan Nguyen, Education, Arts and Sciences, and Business, *Designing Carbonic Anhydrase Inhibitors: Experimentalism and chemistry insight based Molecular Dynamic Simulation*
4. Catalina Revelo, Education, Arts and Sciences, and Business, *Colombian women and the (des) construction of motherhood in a context of marginality and violence in the novel "la perra" by contemporary author Pilar Quintana.*

PRESENTERS AND ABSTRACTS

LISTED ALPHABETICALLY BY FIRST NAME

MISSISSIPPI STATE UNIVERSITY™

GRADUATE STUDENT ASSOCIATION

MISSISSIPPI STATE UNIVERSITY™

THE GRADUATE SCHOOL

Presenter: Abdullah Abu Anzeh

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Xin Cui, Department of Chemistry

Title: Catalytic Hydroborylative Coupling of Allenes for Chemo-, Regio- and Stereoselective Synthesis of Tetrasubstituted 1,3-Diene Compounds

Abstract: A highly selective palladium-catalyzed hydroborylativ intermolecular coupling of allenes to afford highly substituted 1,3-diene has been established. This coupling reaction has shown high chemo- and stereoselectivity. Phenyl allene, and amidoallene afforded stereoisomeric and chemoisomeric products, respectively. Mechanistic study, ligand screening, and single-crystal structure explained the chemo-, stereoselectivity issues. All the products were isolated and fully characterized in moderate to high yield. The synthetic potential of the products as platform molecules for Diels–Alder reaction derivatives has also been demonstrated.

Presenter: Abdullah Al Mamun

Level of Study: PhD

Category: Engineering

Advisor: Dr. Wenmeng Tian, Assistant Professor, Department of Industrial & Systems Engineering

Title: Vibro-acoustics sensor fusion for in-situ bearing fault diagnosis by frequency-domain multilinear principal component analysis

Abstract: Real-time health condition monitoring of bearing has a significant impact on the functionality of the rotary machinery. Multi-channel sensor fusion can be more robust for diverse bearing fault diagnosis scenarios in terms of sensory signal dimensions. However, it poses significant challenges due to the high-dimensional data. State-of-the-art artificial intelligence-based bearing fault diagnosis system comprises multi-channel sensor fusion, time-frequency analysis, feature extraction, and faults classification. Nevertheless, those methods usually require a large training dataset for machine learning model development. In this paper, a new multi-channel sensor fusion methodology, named frequency-domain multilinear principal component analysis (FDMPCA), is proposed by integrating acoustics and vibration signals with different sampling rates and limited training data. Frequency analysis is firstly leveraged to transform the original signals from time to frequency domain, and the frequency responses of multiple heterogeneous channels form a tensor structure, named frequency-domain (FD) tensor. Subsequently, the tensor structure is decomposed by multilinear principal component analysis (MPCA), resulting in low-dimensional process features for fault diagnosis. Finally, the extracted features can be used to train a Neural Network (NN) model for fault diagnosis. To validate the effectiveness of the proposed method, the bearing fault experiments were conducted on a machinery fault simulator while multiple acceleration and acoustic signals were collected. Experimental results demonstrated that the proposed approach can effectively identify the machine fault conditions and outperform the benchmark methods given the limited training data.

Presenter: Abdur Rahman

Level of Study: PhD

Category: Engineering

Advisor: Haifeng Wang, Assistant Professor, Industrial and Systems Engineering

Title: An Interpretable Deep Learning Model for Wood Chip Moisture Content Prediction

Abstract: Wood chips are one of the most prominent biofuel energy sources and an essential raw material for the pulp and paper industries. The quality of the biofuel or pulp is highly dependent on the moisture content of the wood chips. When manufacturers have accurate moisture content information at their disposal, they can adjust their manufacturing processes to ensure the highest quality output with the least amount of waste. Therefore, industrial applications of wood chips necessitate rapid and accurate measurements of moisture content. Existing methods of determining moisture content are either time-consuming or do not offer global moisture content values. In this study, we proposed an image-based deep-learning model for wood chip moisture content measurement. Due to the inherent feature extraction capability of the proposed method, it can operate as an end-to-end process to predict moisture levels from images. The proposed model achieved up to 82.22 percent accuracy and an AUC score of 0.98. We also performed the model interpretability analysis to explain how the model makes predictions. The ultimate goal of this preliminary study is to develop an online tool that can predict the moisture content of wood chips in real-time.

Presenter: Alexis Jackson

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Lori Elmore Staton -- Associate Professor and Graduate Coordinator for Human Development and Family Science

Title: Preparing Colleges and Advisors for the Influx of Mental Illness Experienced by Students

Abstract: Accounts of college student mental illness continue to increase, resulting in a mental health crisis across campuses (Colarossi, 2022; Aslanian & Roth, 2021). Mental illness is defined by disruptive thoughts, feelings, and or behaviors, and in college students, such issues are linked to reduced academic success, increased dropouts, and decreased graduation rates (Njoku, 2022; American Psychiatric Association, 2013; National Society of Leadership & Success, 2022). Colleges and advisors alike often lack the preparation necessary for addressing the observed mental health crisis across college campuses (Abrams, 2022; Aslanian & Roth, 2021). As such, advisors can benefit from mental health training and local community resources that equipment them with the knowledge and tools necessary to assist students navigating mental illness (Harper & Peterson, 2005; Lomax, 2019; Larkin et al., 2015). This proposal explores potential learning, professional development, and training opportunities that advisors can engage in to promote mental health wellness in the students that they advise. Future research should work to better understand what advisors need to best equip them to support students who are experiencing a mental health challenge. Advisors can continue to collaborate with colleges and engage in work centered on preparedness needed to address raising student mental health issues.

Presenter: Alhassan Ibrahim

Level of Study: PhD

Category: Forest Resources and Veterinary Medicine

Advisor: Prof. Hassan, El barbary sustainable bioproduct

Title: Production, Characterization, and Upgrading of Fast Pyrolysis Bio-oil From Rice Straw Feedstock

Abstract: Agricultural residues represent a huge environmental problem as they are mainly burned in the fields. Their effective utilization through fast pyrolysis technique can significantly represent an additional source to produce renewable biofuels. In this study, we pyrolyzed rice straw in an auger reactor at 450 ºC and the physical properties of the produced bio-oil such as water content, higher heating value (HHV), viscosity, density, total acid number (TAN), and pH value were determined. The composition and chemical characteristics of pyrolysis oils were also determined by using gas chromatography-mass spectrometry (GC-MS) and Fourier Transform Infrared (FT-IR) techniques. Noble bimetallic magnetic nanocatalysts supported on activated biochar (Cu-Fe/AcB and Ru-Fe-AcB) were prepared, characterized, and tested for bio-oil upgrading. The obtained results indicated clearly the disappearance of many bio-oil characteristic peaks and production of new hydrocarbon peaks.

Presenter: Amanda Mayo

Level of Study: Master's

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Renee Clary, Department of Geosciences

Title: Effectiveness of Omeka Virtual Collections for Engaging Dunn-Seiler Museum Audiences

Abstract: Museums have been an important part of human history for centuries because of their preservation of important artifacts and cultural relics. Traditionally, visitors would view artifacts and specimens in a gallery and have to travel to the museums to see the collection. Lack of access to museums became a problem during the Covid-19 pandemic and has been a continuing issue for low-income visitors. By creating virtual museum collections through websites like the Omeka Virtual Platform, scientists can share museum collections with a larger audience and are not constrained by financial or geographic barriers. This study will investigate the effectiveness of the Omeka Virtual Platform for learning outcomes. We plan to investigate how virtual museum platforms compare with in-person informal learning with respect to content gain and learners' affective response to the activities. To perform the study, a student researcher will visit classrooms at two schools in Mississippi to perform the activities. The study group will be using the Omeka Virtual Platform to view fossil specimens and then do an activity based on the information on Omeka. The control group will do the same activity but will be exposed to traditional in-person informal learning techniques. Both groups will be given a pre/post-test to measure content gains.

Presenter: Amandeep Kaur

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Jiaxu Li, Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology

Title: Proteomic Analysis in Chloroplasts of soybean (Glycine max L.) under Silicon supplementation and drought Stress

Abstract: Drought stress is one of the major abiotic stress which affects soybean plant growth and yield. Considering a significant area of crop production under water-limited rain-fed conditions, there is a great need to develop production systems to sustain yield potentials under water deficit stress. Silicon has recently been recognized as an important element in plant nutrition. In our previous study, it has been shown that supplying soybean with soluble silicon in the soil could improve vegetative growth and biomass production under water-limiting conditions. However, the mechanism of how silicon alleviates water deficit stress is not understood. Moreover, the previous studies do not have enough information about the interaction of silicon with chloroplast proteins. In this study, we examined the effects of silicon application on chloroplast protein expression. Soybean plants were cultivated in pots containing soil supplied with 2 millimolar solutions of sodium silicate. Equal amounts of sodium chloride were used to reverse the effects of sodium along with control plants. Intact chloroplasts were isolated from the leaves of silicone-treated and control plants exposed to water stress. Proteins were then extracted from isolated chloroplasts. Seventeen spots of differentially expressed chloroplast proteins were identified through Two-dimensional gel electrophoresis and mass spectrometric approaches in response to silicon application under water deficit stress. Go ontology analysis showed that proteins are involved in photosynthesis, oxygen-evolving complex, and calcium ion binding. The KEGG analysis showed that the five proteins are involved in energy metabolism and carbohydrate metabolism pathways. The physiological parameters like stomatal conductance, transpiration, the quantum efficiency of PSII, and chlorophyll pigments were also studied. These results showed that silicon application affects enzymes important for photosynthesis and stabilizes photosynthetic proteins and enzymes under water deficit stress.

Presenter: Andi Durham

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Cliff McKinney; Psychology Department

Title: Indirect Effects of Parental Religiosity on Emerging Adult Risky Sexual Behavior via Family Functioning

Abstract: Objective: Research pertaining to parental religiosity and risky sex behavior (RSB) is vast, seeking to understand how parental religiosity may impact engagement in RSB. However, the inclusion of other possible variables within research models may help the understanding of the intersectionality of religiosity and RSB. The purpose of the study was to examine the associations that parental religiosity has with RSB while including family functioning as a mediator and sex as a moderator. Methods: Participants included 585 individuals (65.5% women and 34.5% men) who completed the Stearns McKinney Assessment of Religious Traits to measure maternal and paternal private, social, coping, conviction, and conservatism. They also completed the Family Functioning Scale (FFS) to assess family expressiveness, cohesion, enmeshment, and conflict, and the Student Sexual Risks Scale (SSRS). Results: Maternal conservatism and family expressiveness had a positive and negative association with RSB, respectively. Maternal coping and maternal conservatism had a negative and positive indirect association with RSB, respectively. Conclusions: Maternal conservatism was directly and indirectly associated with higher levels of RSB while most other aspects of religiosity were not significantly linked to RSB. Future research should specifically focus on conservatism within religion to further understand its impact on individuals' risky behaviors.

Presenter: Anh Vo

Level of Study: PhD

Category: Engineering

Advisor: Filip To, Professor, Department of Agricultural and Biological Engineering

Title: Neuronal Membrane Deformation under Different Traumatic Brain Injury Scenarios

Abstract: Understanding the deformation and mechanoporation failure of neuronal membrane under different injury situations is vital to clarifying the damage biomechanics of traumatic brain injury (TBI) - a leading cause of morbidity and mortality worldwide. To complement experimental studies of these nanoscale cellular impairments, in silico approaches such as molecular dynamics (MD) simulations have been implemented. However, current MD studies mostly do not consider the membrane compositional complexity while examining its mechanical behaviors, as well as apply mechanical stress with only one or two loading scenarios that do not sufficiently represent real-world TBI cases. Hence, this study aims to investigate the mechanical responses and pore evolution of the realistically complex neuronal membrane under various strain rates and strain states in the context of TBI. The membrane model was constructed with 16 lipid types, 400 lipid molecules, 150 mM NaCl, and approximately 50000 water molecules, which represented the composition of the human neuronal membrane. After being equilibrated under 310 K and 1 atm, the membrane was deformed under biaxial tensile loading at three strain rates and nine strain states. During deformation, higher strain rates resulted in smaller but more pores formed in the membrane, as well as larger strain and area per lipid (APL) at failure. Meanwhile, both the size and number of pores were reduced under less equibiaxial strain states, ranging from equibiaxial to non-equibiaxial, strip biaixal, and uniaxial strain state. Besides, under different strain states, the membrane exhibited significantly different strain but similar APL at failure, which suggested that the membrane will fail when reaching a critical APL value. These results clarified the impacts of loading conditions on the mechanoporation failure of the deformed neuronal membrane, which can affect the molecular movement across the membrane and subsequently the homeostasis and viability of the brain cell. Overall, the study provides a non-invasive approach that contributes to the current understanding of nanoscale neuronal injury and, furthermore, lays the foundation for future research in brain dynamics under different TBI scenarios.

Presenter: Arma Regmi

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Dr. David O. Wipf, Department of Chemistry

Title: Electropolymerization of Trifluorovinyl Ether (TFVE) Based Monomers

Abstract: The technique of electrochemical polymerization merges the fields of electrochemistry and polymer-science; thereby allowing polymer films to be deposited directly onto electrode surfaces and reducing the overall complexity of device fabrication. Intriguingly, polymer modified electrodes can be tailored for a wide range of applications (e.g., electrocatalysis, energy storage, and sensors) by tuning their chemical structures. The monomers (small precursor molecules) may be polymerized by electrochemical oxidation or reduction by applying an electrode potential. The resulting electrochemically generated radical cations or anions combine with one another to form larger molecules (oligomers) that absorb at the electrode surface where they continue to grow – eventually forming a layer of polymer film. In this study, we examine whether monomers containing a trifluorivinylether (TFVE, R–O–CF=CF2) functional group can be electrochemically polymerized to produce "Teflon-like" partially-fluorinated-polymers. Both oxidative and reductive potential windows have been interrogated by cyclic voltammetry (CV) to attempt to polymerize TFVE containing monomers with mono-, bi-, and tri-TFVE functional groups. Optical micrographs of "passivated electrodes", formed under reductive electro-polymerization, show the presence of thin uniform films, while the oxidative electro-polymerization generates randomly scattered deposits. Infrared (IR) spectroscopy of the passivated electrodes prepared by the reductive-method indicates the presence of C-F bonds in the films. These results demonstrate that electrochemical deposition can be used to produce uniformly packed "Teflon-like" thin films from TFVE-monomers. To the best of our knowledge, this is the first example of an electrochemically generated polymer from TFVE based monomers; offering new opportunities for device fabrication where semi-fluorinated polymer thin films are required.

Presenter: Ayantha Senanayaka

Level of Study: PhD

Category: Engineering

Advisor: Prof. Linkan Bian, Industrial Systems and Engineering

Title: Rapid Porosity Prediction of Additive Manufacturing under Different Process Conditions

Abstract: This study aims to develop an intelligent, rapid porosity prediction methodology additive manufacturing (AM) processes under varying process conditions by leveraging knowledge transfer from the existing process conditions. Conventional machine learning (ML) algorithms are extensively used in porosity prediction for AM processes. These approaches assume that the training (source) and testing (target) data follow the same probability distribution, and the labeled data are available in both source and target domains. However, the source and target do not always follow the same distribution in real-world manufacturing environments as the diversity of industrialization processes leads to heterogeneous data collection under different production conditions. This will reduce the ability of decision-making with conventional approaches. Transfer learning (TL) is one of the robust techniques that enables transferring learned knowledge between source and target to establish a robust relationship while the target has less data. Therefore, this paper presents similarity-based multi-source transfer learning (SiMuS-TL) method to characterize the relationship between a source and an unknown target. The similarities between sources and targets are learned by forming a new mixed domain, which organizes data into identity groups. Then, a group-based learning process is designated to transfer knowledge to make target predictions. The effectiveness of the SiMuS-TL is evaluated by predicting porosity based on thermal images collected from the AM process under different process conditions, i.e., single-source and multi-sources transfer to target porosity prediction. The performance comparison demonstrates that the in-situ porosity prediction using the proposed SiMuS-TL method outperformed conventional support vector machine (SVM), convolutional neural network (CNN), and different TL methods such as TL with NNs (TLNN) and TL with CNNs (TLCNN).

Presenter: Bennett R. Pope

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Rahel Mathews, Assistant Professor, Department of Food Science, Nutrition, and Health Promotion

Title: The Association Between Hispanic Men's Food Insecurity and Oral Health

Abstract: Food insecurity and oral health remain critical problems in the United States, yet limited studies examine the association between food insecurity and oral disease among minorities. The purpose of this study was to determine the relationship between food security and oral health in Hispanic men in the United States. NHANES 2015-2018 data was used. A total of 4,077 adult males comprised the final sample size, of whom 991 were Hispanic. Participants may have full, marginal, low, or very low food security according to USDA ERS definitions. Good or poor oral health was determined by proxy using self-reported oral health questions identified by the CDC and AAP as promising for periodontitis prevalence estimation. Frequency statistics described the proportions of key sociodemographics. Logistic regression tested the association between food insecurity and self-reported oral health. The final model was adjusted for individual and household covariates. Statistical significance was set at $p < 0.05$. Nearly a quarter (23%) of participants were food insecure (low or very low). The majority (69%) reported poor oral health. Participants with very low (AOR = 2.26 [95% CI {1.66-3.09}], $p < 0.001$) and low (AOR = 1.29 [95% CI {1.03-1.62}], $p = 0.028$) food security were more likely to report poor oral health. Food insecurity increases poor oral health odds. Culturally competent strategies should address men's health, emphasizing food insecurity and oral health. Strategies may include seeking bilingual food pantry volunteers, connecting pantry clients to oral health resources, hosting free screenings, or other interventions at an accessible site.

Presenter: Bikash Adhikari

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli, Plant and Soil Sciences

Title: Response of lettuce (Lactuca sativa L.) to salt stress

Abstract: Lettuce is a cool-season vegetable and widely consumed leafy salad in the United States. Salt stress is a widespread problem caused by drastic climate change and affects the productivity of lettuce. Limited availability of salt-free is a rising concern for lettuce production under hydroponics. Despite growing evidence supporting salt stress-induced changes in yield and quality loss, studies on romaine lettuce salt stress tolerance are limited. Thus, this study aimed to investigate the response of morph-physiological and biochemical attributes of the "Green Forest" romaine lettuce cultivar under salt stress (SS). The experiment was arranged in a randomized complete block design in a greenhouse under hydroponics. Exposure of lettuce to 150, 100, and 50 mM NaCl treatments decreased fresh weight by 76%, 54%, and 29% compared to the control (0 mM), respectively. Several gas exchange parameters, such as transpiration rate, stomatal conductance, mesophyll conductance, and intercellular carbon dioxide, were severely decreased with increased SS during both GS. Besides no changes in the carbon assimilation rate, water use efficiency increased linearly with increased SS. The phenolic compounds and sugar analysis supported the morphological and physiological changes. In response to SS, lettuce leaves accumulated higher amounts of phenolics and sugar compounds to counter oxidative stress damage. The imbalance in the mineral nutrient (higher sodium and lower potassium) under SS also supported morpho-physiological and biochemical changes across growth stages. Our study identified salt-sensitive growth stages, phenotypic traits associated with salt stress tolerance, and contrasting salt-tolerant cultivar genotypes.

Presenter: Bikash Adhikari

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli. Assistant Research Professor, Plant and Soil Sciences

Title: Seed priming attenuates salt stress impact and improves yield in lettuce

Abstract: Crop production around the world is becoming increasingly vulnerable to changes in climate. In the USA, lettuce is a widely consumed cool-season leafy vegetable that is salt sensitive. Salt stress is one of the most impactful environmental conditions that hinder crop production. Excess of soluble salts around the root zone affects water uptake and essential nutrients. Hydroponic lettuce production often suffers from ionic and osmotic shocks due to hard water or salt stress. Therefore, this research aimed to identify the cost-effective seed priming method to attenuate the deleterious effect of salt stress during the early rosette stage of lettuce. Three different priming treatments, such as 0.5% potassium nitrate (KNO3), 50 mM calcium chloride (CaCl2), and hydro-primed, were used, including one no-priming or control. Once the primed seeds regained their original moisture content, salt treatment (NaCl, 100 mM) was applied. Salt-treated primed seeds were sown in the rock wool and kept in the growth chamber at 22/18 °C day/night temperatures. Twenty-one days old seedlings were transplanted to compact disc cases, and the cases were placed in the deep water culture hydroponic tubs containing Hoagland solution. Morph-physiological and biochemical traits varied among priming treatments. All priming methods significantly influenced fresh mass under salt compared to the control. However, the hydro-primed seeds had higher leaf mass under salt stress than the rest. Likewise, root traits such as root length, tips, and surface area were superior in the hydro-primed, followed by KNO3-primed lettuce. Conversely, root traits of CaCl2-primed seeds were significantly reduced under salt stress. There was no difference in the photosynthetic rate of hydro-primed seeds between control and salt stress. In CaCl2-primed and control plants, NaCl treatment reduced transpiration, stomatal conductance, and CO2 assimilation rate. The CaCl2 and KNO3-primed lettuce exhibited increased membrane injury and lipid damage under stress. In contrast, hydro-primed seeds demonstrated a higher proline accumulation to counter membrane injury and lipid peroxidation. Overall, hydro-priming of lettuce seeds increases resilience under salt stress compared to CaCl2 and KNO3. This study suggests that hydropriming can mitigate salt-induced stress in hydroponic lettuce.

Presenter: Binod Regmi

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Prof. Seong-Gon Kim

Title: Probing High Quantum Oscillation Frequency from the Reconstructed Fermi Surface of Kagome Superconductor KV3Sb5: Theoretical Explorations

Abstract: We employ an ab initio approach to examine the structural and electronic properties of pristine and charge density wave (CDW) phases of Kagome metal KV3Sb5. We study the Inverse Star of David (ISOD) CDW phase of this metal and reveal that the (2x2x1) modulated ISOD phase is the correct ground state by our total-energy calculation. We also visualize a remnant of stronger CDW in ISOD phase owing to a sharp trough of states below and above the Fermi level from our density of states calculation. Because of CDW transition, the Fermi surface undergoes a strong reconstruction which can be visualized in this study. For direct comparison with experimental results, we also compute a quantum oscillation frequency from the extremal area of the Fermi surface cross-section (A) projected along the field direction, and, more remarkably, our theoretical results are consistent with the experimentally measured Fermi surface frequencies.

Presenter: Brad Sampson

Level of Study: Master's

Category: Engineering

Advisor: Matthew Priddy, Ph.D., Department of Mechanical Engineering

Title: Mechanical Characterization of Functionally Graded Cellular Structures

Abstract: Traditional methods for increasing the energy absorption of a structure involve using a stronger material or increasing the thickness of the structure. These methods typically result in a higher cost due to the need for a higher strength material or additional weight. Optimization of the three-dimensional (3D) geometry is a relatively new method for increasing energy absorption via additive manufacturing (AM). This is accomplished with functionally graded cellular structures. One form of AM, laser powder bed fusion (L-PBF), has been a popular method for fabrication of cellular structures in recent years due to its layered process, high geometric accuracy, and wide range of available materials. Previous work has shown that the energy absorption of cellular structures can be improved by changing the strut diameter of the unit cell (rod-grading) or the size of the unit cell (size-grading) throughout the height of the structure; however, this strategy has not been applied to ultra-high strength steel materials. In this research, functionally graded cellular structures made from ultra-high strength steel are characterized experimentally to determine characteristics such as geometric accuracy, energy absorption to weight ratio, and whether deformation occurs from bending of struts or nodal cracking. These grading strategies include uniform gradation, rod-gradation, and size-gradation, and each cellular structure is designed with approximately the same average relative density to analyze the structures on an equal-mass basis.

Presenter: Brooke Paben

Level of Study: Master's

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Hallie Smith, Department of Counseling, Educational Psychology, and Foundations

Title: Count Your Chews! A Self-Monitoring Intervention to Increase Chewing Efficiency

Abstract: Oral-motor skill deficits and food selectivity often coincide, particularly when it comes to the consumption of regular texture foods. Common interventions that are used to address food selectivity include differential reinforcement, escape extinction, and demand fading (Silverman, 2016). However, when an individual's food selectivity is more closely related to oral-motor skill deficits or delays, these interventions may not be appropriate or effective. There is limited research on the use of behavioral interventions to address chewing efficiency, largely because these concerns are treated primarily by speech language pathologists or occupational therapists, and not by behavior analysts. The current study aimed to fill this gap in the literature by developing a self-monitoring intervention to decrease the number of chews and the latency to mouth clean regular texture food using a multiple baseline design across foods. Results indicated that this intervention was effective at increasing the efficiency of chewing for this participant.

Presenter: Carson Roberts

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Drew Gholson, Irrigation Specialist, Department of Plant and Soil Sciences

Title: Cover Crops Can Reduce Irrigation Water Use in Cotton

Abstract: Improved cropping systems are needed to reduce irrigation water use of cotton where irrigation water is drawn from the declining Mississippi River Valley Alluvial Aquifer. A study conducted in Stoneville, MS, from 2021 to 2023 is assessing viable cropping systems for the mid-south to conserve irrigation water. Study treatments were established in the fall of 2020 and include reduced tillage, subsoil, winter fallow (RT); strip till, winter fallow; strip till, cover crop; strip till, subsoil, cover crop; no till, winter fallow; no till, cover crop; and no till, minimal surface disturbance subsoil, cover crop. Each treatment was individually irrigated based on tension-based soil moisture status. In the first year of full study implementation (2021), high amounts of timely rainfall made irrigation unneeded. In 2022 precipitation was closer to normal. Cover crops improved soil moisture by as much as 47 kPa compared to the conventional, RT treatment. Compared to all winter fallow treatments, the treatments with a cover crop retained more soil moisture with soil moisture tension being 57% lower. This resulted in more irrigation water used in treatments with winter fallow. There were few differences in lint yield between the treatments, and yields were not improved by increased irrigation. Cover crops can be used to conserve water in cotton without reducing yield in the mid-south during years with normal precipitation.

Presenter: Catalina Revelo

Level of Study: Master's

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Sol Pelaez, Head of Spanish Department, Classical and Modern Languages and Literatures

Title: Colombian women and the (des) construction of motherhood in a context of marginality and violence in the novel "la perra" by contemporary author Pilar Quintana.

Abstract: In the novel “La perra” by Pilar Quintana, narrated the story of a black woman in Colombia, who lives in a marginal area of Choco, whose desire to be a mother is frustrated by her inability to have children, so she decides to adopt a dog. In this context, it is difficult for the protagonist to face all the aspects and roles determined by the society that excludes her due to her procreative incapacity. Maternity has materialized as a reaffirmation of femininity, thus determining the role that women must acquire from childhood. The figure of the mother in Colombian literature has been balanced by macho and patriarchal thinking, which has led women to live under a series of stereotypes that must be met. So much so that motherhood becomes the center of the identity of Colombian women. How mothers experience motherhood is part of the social context in which they live. In this way, I seek to identify and question how the idealization of the concept of motherhood is constructed and deconstructed in Pilar Quintanilla's novel “La perra” and what nuances are given to it in a context of marginality and violence in the Choco region (Colombia).

Presenter: Chathuri Peiris

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Prof. Todd E. Mlsna, Department of Chemistry

Title: Comparisons of Biochar-supported Iron Nanoparticle Composites Synthesized from Carbothermal and Borohydride Reductions.

Abstract: Application of bare nano zerovalent iron (nZVI) for remediation purposes has been limited owing to its aggregation and rapid passivation issues. Thus, biochar (BC) has been widely used as a supporter for nZVI, as it inhibits aggregation leading to better dispersion on the BC surface and improved reactivity of nZVI. In the present study, BC/nZVI was synthesized using two different methods, namely the liquid phase reduction (LPR) and the carbothermal reduction (CTR) method. The performance of the two synthesized materials and their stability in air and water were subsequently compared. The materials were characterized using XRD, SEM, and BET to evaluate structural changes upon aging. The performance of the BC/nZVIs was evaluated using Cu adsorption studies' removal was carried out to investigate its performance. The Fe loading of the synthesized materials was 5% and 15%. XRD results showed that the nZVI synthesized through CTR had a higher crystallite size (244.35 - 316.78 nm) compared to nZVI synthesized via LPR (45.23 - 70.36 nm) regardless of Fe loading. Additionally, the sharp peaks in the XRD spectra indicated that the BC/nZVI synthesized using CTR are more crystalline. The BC-Fe015 synthesized via LPR exhibited a Cu removal of 31.83 ± 0.49 mg/g (212.22 ± 9.23 mg/g per Fe0) which was reduced by 2.5 times after air exposure for 7 days. A similar drop was observed when it was exposed to water for just 1 hour, indicating that the synthesized material is more stable in air than in water. Presumably, the protective iron oxide layer undergoes dissolution in water, making Fe0 available for oxidation. On the other hand, BC600-G@Fe015% obtained through CTR showed Cu adsorption of 39.87 ± 0.39 mg/g (265.80 ± 0.42 mg/g per Fe0) which only decreased by 1.1 times, after air exposure for 7 days confirming that the material synthesized via CTR has better air stability. This study revealed that BC/ nZVI synthesized via CTR is more resistant to air oxidation.

Presenter: Cliff Thames

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Tommy Phillips, Ph.D., Associate Professor of Human Development and Family Science

Title: The impact of extracurricular activities on adolescents from high-poverty vs. low-poverty areas and their perception of the influence on their development

Abstract: The current study aimed to investigate and develop a deeper understanding of extracurricular activities (ECAs) and their impacts on adolescent development using two self-report tools, the YES 2.0 and the Delinquent Attitude Scale (DAS). The study surveyed 174 high school seniors at three different types of schools in Mississippi. Of those, 58% were from high-poverty areas, while 42% were from low-poverty areas. Within this study, two articles were written, one containing information about participation levels and opportunities in ECAs, and the barriers to participation in these ECAs and the other extending the study to include data on students' perceptions of ECAs' impact on their positive and negative development.

Specifically, article 1 explored disparities (i.e., funding, availability, lack of student choice) in ECA opportunities and potential differences in student participation levels in poverty areas. Students were also asked about potential barriers that might keep them from participating in ECAs. The study found that students in high-poverty schools were less likely to participate in ECAs. In contrast, students in low-poverty schools were more likely to report satisfaction with ECA opportunities. The study also found that lack of awareness about programs was the most common barrier reported by students. There can be a higher emphasis on recruiting for ECAs. Schools can have an ECA night at school where all ECAs set up a table at the beginning of each year. Schools can also begin recruiting and involving students at younger ages prior to high school.

Article 2 takes an in depth analysis into the connection ECAs had in promoting positive and negative outcomes for youth, mainly focusing on the potential impact of ECAs on adolescent development in high and low-poverty areas. The results suggested that ECA participation plus poverty impacts the effects of positive and negative experiences in ECAs in specific contexts. Particular positive development areas were affected by ECA participation, and the impact on negative development was minimal in this study in all poverty groups. At a certain point, some students who participated in more ECAs adversely affected grades among high-poverty students.

Presenter: Darren Shoemaker

Level of Study: PhD

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Leandro Miranda, Wildlife, Fisheries & Aquaculture

Title: Vulnerability of reservoir fish habitats to climate change

Abstract: Reservoir fish habitat decline due to aging is well documented, but climate change may accelerate this decline. However, models suggest climate will impact different geographic areas at varying intensities. Because of this unevenness, scientists and stakeholders need to identify which habitats are likely to experience detrimental effects. Reservoirs are uniquely valuable habitats because they serve a wide variety of ecological and societal functions, including water supply, fish conservation, and recreation. We are developing a vulnerability index for reservoirs across the United States to better prepare stakeholders for climate change during the 21st century. A database which includes relevant habitat characteristics such as reservoir size, depth, catchment, and land use for 3,825 reservoirs across the United States was obtained from the Reservoir Fish Habitat Partnership. Estimates for 19 historic (1970-2000) and future (2081-2100) bioclimatic indicators were obtained for each of the reservoirs from the climate database WorldClim at a 2.5 minute spatial resolution (~4.5 km at the equator). These indicators include various descriptors of temperature and precipitation commonly applied in climate change investigations and likely to directly influence fish habitats. We intend to use modeling to identify which reservoir habitat characteristics are influenced by the 19 bioindicators. We will then determine the differences between the historic and future climate conditions at each reservoir to estimate the intensity of the effects of climate change. From these, we can predict which reservoirs and which habitat characteristics are likely to be impacted by climate change. We will use the results of this study to create an index of vulnerability for the United States which shows where and how reservoir conditions are likely to be affected by climate. This will be a valuable tool for fish and reservoir managers to determine how to best allocate limited resources when making conservation decisions.

Presenter: David Failla Jr.

Level of Study: PhD

Category: Engineering

Advisor: Dr. Matthew W. Priddy, Assistant Professor of Mechanical Engineering

Title: A Numerical Approach to Predicting the Effects of Spatial Gradation in Lattice Structures

Abstract: The development of numerical tools for modeling lattice structures aids in the reduction of the experimental time and costs associated with characterization. By predicting the failure modes, energy absorption, and development of the stress state, fewer lattice structures are needed to be fabricated for experimental characterization and part qualification. Towards this goal, the current effort numerically demonstrates the efficacy of strut diameter variation on the energy absorption capacity of additively manufactured (AM) body-centered cubic with Z-strut (BCCZ) lattice structures for quasi-static loading. Furthermore, the failure mechanics of the lattice can be predicted leveraged for stretch-dominated failure to increase energy absorption capacity or buckle-dominated failure for an increase in bulk strength with reduced weight. Using finite element method predictions, AM 316L BCCZ unit cell lattice structures fabricated via laser-powder bed fusion (L-PBF) are designed with independently varied strut diameters and characterized for quasi-static loading applications. Down-selected unit cells with varying strut sizes were stacked to develop a column structure with functionally graded properties from increased strength to increased energy absorption through the height to characterize stacking effects. Finally, the initial unit cell structure was scaled in all three dimensions and simulated to estimate scaling effects. Results indicate that with increased lattice structure scaling, the energy absorption capacity of the structure also increases due to the increase in number of layers of lattice struts collapsing.

Presenter: Dharani Matharage

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Amy Dapper, Assistant Professor, Biological Sciences

Title: Variation in Intra-Chromosomal Patterns of Recombination Rate between Wild-Derived Populations of Caenorhabditis elegans

Abstract: Meiotic recombination is a cellular process that occurs during the first stage of meiosis and results in the exchange of genetic material between homologous chromosomes. One consequence of meiotic recombination is the production of recombined chromosomes with novel combinations of alleles. Variation in recombination rate is important to study because it shapes patterns of genetic diversity, the raw material of evolution, within and between genomes. Errors in meiotic recombination are also a key cause of human disease. However, measuring recombination rate is difficult, as most methods are not time-friendly nor affordable. Caenorhabditis elegans is a convenient system for studying recombination that avoids many common pitfalls. However, there has only been limited research on whether there is variation in recombination rates in C. elegans. Here, I investigate the variation in intra-chromosomal patterns of recombination rate in wild-derived populations of C. elegans. I use phenotypic fluorescent markers which are tagged in chromosome IV to estimate the recombination rate of N2 and CB4856 strains, that are the most genetically distinct strains of C. elegans. I identified statistically significant differences in recombination rate between these two strains, with CB4856 having approximately 5% higher crossover rate in this interval. Additionally, I found no evidence of heterochiasmy (sex differences in recombination rate). These results open the door to using C. elegans to study the evolution and genetics of variation in recombination rate.

Presenter: Divya Rose

Level of Study: PhD

Category: Forest Resources and Veterinary Medicine

Advisor: Matthew J. Griffin , Research Professor, Department of Pathobiology and Population Medicine

Title: Analysis of microbial community diversity in channel catfish ponds : A comprehensive study from 'The Delta'

Abstract: Mississippi is the largest catfish producer in the United States, producing 58% of U.S farm-raised catfish; with active aquaculture ponds covering >36,000 acres. The majority of Mississippi catfish production is in the Delta region, located in the western part of the state. Bacterial disease accounts for most disease related losses. Prophylactic vaccines exist for Edwardsiella ictaluri and Flavobacterium columnare, but at present, only the orally delivered E. ictaluri vaccine has gained widespread industry adoption. Due to limited efficacious vaccines, feed restriction or antibiotic intervention are the most practiced management strategies to control bacterial outbreaks in catfish ponds. Reports from the Aquatic Research and Diagnostic Laboratory (ARDL) in Stoneville, MS, show an increase in antibiotic resistant (ABR) bacterial isolates over the past decade. Considering these developments, a metagenomic assessment was performed on pond water samples from two adjacent catfish farms (<4 miles apart): each employing different strategies for antibiotic use. Both farms focus on channel catfish production and vaccinate their fingerling stocks using an orally delivered, live attenuated E. ictaluri vaccine. Farm A uses medicated feed in response to disease outbreaks, while Farm B employs feed restriction and does not rely on antibiotic intervention. Herein, the influence of on-farm antibiotic use on catfish pond microbial communities was assessed. High throughput 16S rRNA gene sequencing was performed on 56 pond water samples (33 from Farm A; 23 from Farm B) to assess bacterial community structure in ponds across both farms. Comparative analysis of relative abundance of multiple bacterial species revealed differences across the two farms. When analysis was limited to bacterial genera significant to fish health, Mycobacterium spp. were found to be the most abundant genera. Similarly, Flavobacterium spp. were consistently present on both farms, with Farm A (routine antibiotic use) having a slightly higher relative abundance. Interestingly, both Chryseobacterium spp. and Lactococcus spp. were observed with high relative abundance in some ponds on Farm B (no antibiotic use), both of which are considered potentially emergent fish pathogens. Visualization of beta diversity revealed differences in bacterial community structure between the two farms, while alpha diversity assessments demonstrated differences between the two farms. These analyses illustrate a possible difference in the bacterial community composition between farms that employ antibiotic interventions versus farms that rely on restricted feeding. These data lay the foundation for further research investigating the biological significance of the varied bacterial communities observed on these two farms.

Presenter: Durga Purushotham Mahesh Chinthalapudi

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Shankar Shanmugam G.

Title: Exploring the Impacts of Cover Crops on Soil Health and Bacterial Community Abundance and Diversity in Corn Production Systems

Abstract: Maintaining the properties of soil health in agroecosystems is critical for sustainable agriculture and crop productivity. Soil microbial communities' abundance and activity are essential indicators of soil health following the successful integration of cover crops in corn production systems. This is due to the vital roles soil microbial communities play in nutrient cycling, soil aggregation, and water-holding capacity, which are the key benefits of cover crop adoption. However, there is a need for further research to better understand the practical implications of cover crops and their various functional impacts on microbial abundance and diversity. To understand microbial abundance and diversity, we employed a metagenomics approach. The study was a strip-plot design with three replications in two locations (Starkville and Newton, MS). The experiment consisted of two factors: (A) fertilizer application (0 lbs. nitrogen or 100 lbs. nitrogen) and (B) cover crop treatments (Control, Ryegrass, Balansa, Radish, Red clover, Oats + Radish, and Ryegrass + Radish + Red clover). To examine the microbial communities, amplicon sequencing of the 16S rRNA gene was performed for bacteria and the ITS2 gene was used for fungi. The DNA sequence data were processed using the QIIME2 pipeline. Our results showed significant differences in the bacterial community composition between the two locations (Bray Curtis, p-value-0.005). Cover crop treatments showed significant differences in alpha-diversity richness across locations. However, in the Starkville location, the Shannon diversity analysis showed no significant difference across treatment plots. Furthermore, the cover crop treatments showed a differential increase in bacterial phyla, such as Proteobacteria, Actinobacteria, and Acidobacteria.

Presenter: Durga Purushotham Mahesh Chinthalapudi

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Shankar Shanmugam G.

Title: Investigating the Effects of Cover Crops on Soil Microbial Communities and N availability in Corn Production Systems

Abstract: Soil quality and fertility are integral components of sustainable crop production. One key indicator of soil quality is the structure and function of soil microorganisms, which play a vital role in nutrient cycling, particularly nitrogen (N). The incorporation of cover crops into agricultural practices has been shown to improve soil fertility, thereby promoting sustainability and productivity. Despite the recognized benefits, there is still limited understanding of the differential impacts that cover crops may have on soil microbial communities and nitrogen metabolism. The use of bioinformatics tools helps to predict the functional capabilities of soil microbial communities through the analysis of 16S rRNA gene profiles. In this study, we aim to investigate the effects of cover crops on soil microbial communities and the N cycle in corn production systems, in order to understand their impact on soil fertility. The study was a strip-plot design with three replications in two locations (Starkville and Newton, MS). The experiment consisted of two factors: (A) fertilizer application (0 lbs. nitrogen or 100 lbs. nitrogen) and (B) cover crop treatments (Control, Ryegrass, Balansa, Radish, Red clover, Oats + Radish, and Ryegrass + Radish + Red clover). To examine the microbial communities, amplicon sequencing of the 16S rRNA gene was performed for bacteria and the ITS2 gene was used for fungi. The DNA sequence data was processed using the QIIME2 pipeline, and the Tax4Fun2 software package was utilized to predict the functional groups involved in nitrogen metabolism. Our results showed significant differences in the bacterial community composition between the two locations (Bray Curtis, p-value-0.005). Cover crop treatments showed a significant differences in alpha-diveristy richness across locations. However, in the Starkville location, the Shannon diversity analysis showed no significant difference across treatment plots. Furthermore, the cover crop treatments showed differential increase in bacterial phyla, such as Proteobacteria, Actinobacteria, and Acidobacteria. The legume Balansa treatment showed higher functional diversity of organisms involved in nitrogen metabolism, which might have been due to the abundance of symbiotic nitrogen-fixing bacteria in those plots.

Presenter: Ethan Schuetzle

Level of Study: Master's

Category: Engineering

Advisor: Dr. Heejin Cho, Associate Professor, Mechanical Engineering

Title: "Determination of Correction Factors for Measured Real Time Particle Mass Distributions"

Abstract: Effective removal of airborne particles from the air we breathe has become more important than ever. The need for efficient filtration does not end with protection from viruses or pollution, rather it extends into the field of nuclear energy through the containment of radioactive particles. Various instruments have been utilized in the past several decades to obtain size distributions for aerosols. This data can then be used to understand how airborne contaminants can be filtered, or otherwise affect human health. A common aerosol measurement instrument is the cascade impactor. This device utilizes impaction, a distinct application of an aerosol particle's curvilinear motion, to obtain particle size and mass distributions for aerosols. More modern aerosol measurement instruments are complex and utilize various phenomena to classify particles by size. For example, the Scanning Mobility Particle Sizer (SMPS) classifies particles based on their electrical mobility, or the ability of charged particles to move through a medium when subjected to an electric field. The SMPS is the preferred instrument due to its ease of use and higher resolution data output but is not considered perfect. Thus, the purpose of this work is to correct the size distribution obtained from the SMPS using the measurements taken by the cascade impactor as the baseline. The cascade impactor is used because it is assumed to produce an accurate mass distribution of an aerosol over a wide particle size range. Although the cascade impactor is a great tool for this purpose, some level of effort is required to ensure that the impactor will operate ideally. Steps have also been taken to correct the data from the cascade impactor to account for realistic operation and losses. A test stand designed to test High Efficiency Particulate Air (HEPA) filter media is used to run the cascade impactor and the SMPS in parallel, subjecting the instruments to the same testing conditions. The results of these tests are then compared to correct the size distribution obtained from the SMPS. The results of this work and its implications will be discussed, and future work is identified.

Presenter: Faith Henson

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Maryam Mohammadi-Aragh, ABE

Title: Influence of biochar and poultry litter treatment (PLT) on broiler litter Escherichia coli populations and antimicrobial-resistance genes during a live grow-out.

Abstract: Meat chickens (broilers) are raised on litter, which is a substrate containing wood shavings, spilt feed, and manure. Broiler litter quality is essential to producing healthy birds, as high ammonia, moisture, and microbial loads can lead to lower performance and disease. Escherichia coli (E. coli) is a mostly commensal bacteria in the chicken digestive tract; however, some strains are pathogenic and can result in substantial economic losses. Litter amendments, such as poultry litter treatment (PLT), are commonly used to acidify litter. Biochar (BC) is a highly porous and carbonaceous material in abundant supply from forest products operations in Mississippi. BC can benefit soils and composts; however, less is known on how BC impacts broiler litter as an alternative, sustainable amendment. The objectives of this study were to determine the impact of pine BC and PLT on litter E. coli populations and antimicrobial-resistance genes (ARG) in a live bird trial. Birds were grown in 60 ft2 rooms with 44 birds per room over 42 days. Pine BC, PLT, and a control were included as treatments with five replicates (n = 15). BC was surface applied at a 30% (v/v) inclusion rate, and PLT was applied at 0.73 kg/m2. Litter samples were collected on days 0, 17, 28, and 41 for E. coli enumeration using Chromocult® agar, and bacterial pellets were stored at -80°C for future ARG analysis. Variations in E. coli counts among treatments were statistically analyzed using PROC Mixed in Statistical Analysis Software (SAS) at a 95% confidence level ($P < 0.05$). Overall, litter amendments did not significantly influence E. coli populations ($P = 0.09$); however, BC-treated litter had significantly lower E. coli counts than the control at day 41. Time had a significant impact on E. coli populations ($P < .0001$), with E. coli counts rising from days 0 to 29 and then significantly decreasing from days 29 to 41. Antibiotic resistance gene analysis is in progress and will yield valuable information on how litter amendments impact ARG prevalence in broiler litter

Presenter: Franklin Quin, Jr.

Level of Study: PhD

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Tamara Franca, Assistant Professor, Department of Sustainable Bioproducts

Title: Structural Performance of the Post-To-Rail Connectors in a Hardwood Stairway HandRail Guard

Abstract: The performance of two single bolt post-to-rail connection systems for a stairway handrail was evaluated. These two connection systems are popular in the stairway construction industry because of the ease of use. Red oak posts and rails along with the connection hardware was secured from a local stairway hardwood supply manufacturer. T-shaped cantilever typed joints were constructed to determine the initial stiffness, yield rotation, yield strength, ductility, and strength at a rotation of 0.15 radians under monotonic and reverse-cyclic loading. There was a difference between the initial stiffness of the joint configurations, but there was no significant difference between the yield strength and the maximum strength. Both joint configurations proved to be ductile with the major modes of failure being compression of the wood on the rail and post and the yielding of the bolt.

Presenter: Gabriel Nyen

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Adam D. Polinko, Assistant Professor, Department of Forestry

Title: Silvicultural strategies for converting longleaf pine plantations to multi-aged longleaf pine stands

Abstract: In the late 1990s and early 2000s, incentives for planting longleaf pine resulted in thousands of hectares of marginal agricultural lands being converted to longleaf pine plantations. One planting strategy in the southeastern United States is to plant more trees than the land can support, and eventually thin the stand to a lower quantity of trees. For plantations that have been commercially thinned, ecosystem services like improved wildlife habitat and carbon sequestration could lead some landowners to convert plantations to multi-aged stands. However, silvicultural strategies for converting longleaf pine plantations to multi-aged stands need to be developed for a variety of site conditions. The overall goal of our project is to develop silvicultural strategies for converting longleaf pine plantations to multi-aged longleaf pine stands. We hope to develop an anthropogenically produced natural disturbance analog for converting plantations to multi-aged longleaf pine stands. One of our main objectives is to develop guidelines for restoring native grasses and forbs after the first commercial thinning of planted pines. These guidelines will be based on actual plantings of native groundcover after commercial thinning in longleaf pine plantations at the Jones Center at Ichauway in southwestern Georgia. The relative success of groundcover restoration will be based on the aboveground biomass of individual species of native grasses and forbs. We will also determine the influence of canopy openness on different species interactions in the understory. Finally, we will determine if specific silvicultural treatments can aid in longleaf pine recruitment in the aftermath of Hurricane Michael (October 2018).

Presenter: Gwendolyn Williams

Level of Study: Master's

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Zach Ahonle, Rehabilitation Counseling

Title: The Experiences of Ex-offenders with Disabilities-Implications for Vocational Rehabilitation: A literature Review

Abstract: This review examined various studies to examine the experiences of ex-offenders with disabilities and provides insight on topics such as barriers to successful reintegration, employment outcomes and best practices for rehabilitation counselors. Method: The databases that were searched included EBSCO Academic Search Complete, APA PsycArticles, APA PsycInfo, ERIC, MEDLINE, Psychology and Behavioral Sciences Collection, and Vocational and Career Collection, other databases searched included, google scholar. Studies were published between 2013 to 2022. Results: This review suggests ex-offenders with disabilities are disproportionately underemployed and unemployed and are a vulnerable group in community reintegration. Race, geographical location, gender, and stigmas play a large part in this employment gap. VR (Vocational Rehabilitation) Services are not always used or available to this population, but some services known to increase employment odds are job services, disability services and other rehabilitation services, and group services. Directions for future research will be discussed.

Presenter: Hafez Ahmad

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: L. E. Miranda, Professor, Department of Wildlife, Fisheries, and Aquaculture

Title: Assessing the Relationship between Hydrological Connectivity and Fish Assemblage in the Mississippi Alluvial Valley Floodplain

Abstract: Floodplains are complex systems that provide essential habitats for fish, but human activities such as dam construction and land use changes can disrupt the natural hydrological connectivity of these systems. Hydrological connectivity is a key concept in understanding the functioning of floodplain systems and the distribution of aquatic organisms. This study aimed to assess the hydrological connectivity in the Mississippi alluvial valley and its effect on fish assemblage and distribution. Connectivity indices such as the Index of Connectivity (IC), Structural Connectivity (SC), Longitudinal Functional Connectivity (FC), and Geostatistical Connectivity (GCF) were used to evaluate the different aspects of connectivity in the large floodplain's oxbow lakes. Field observations, Remote sensing, and GIS techniques were used to collect data on the landscape features that influence connectivity. To investigate the relationship between hydrological connectivity and fish assemblage, we used a Multivariate statistical technique called Canonical correspondence analysis (CCA) and species diversity indices using oxbow lake's presence and absence data and the hydrological connectivity indices. The CCA results showed that maximum distance of connection (cfdD) and index of connectivity (IC) strongly link hydrological connectivity and fish assemblage in oxbow lakes, whereas SC and FC have a weaker relationship. The ANOVA results indicate that there is a significant relationship between the species diversity and cfdD (F value = 4.175, p = 0.0446) and species richness and cfdD (F value = 4.429, p = 0.0387) throughout the oxbow lakes. Conversely, IC, SC, and FC values were rarely associated with fish diversity and richness. The study provides valuable information for designing conservation strategies for fish assemblage and distribution in oxbow lakes within the lower Mississippi alluvial valley, emphasizing the importance of hydrological connectivity for maintaining biodiversity and ecosystem function and the need for effective management strategies to preserve and enhance it.

Presenter: Htet Lin Naing

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Austin Himes, Assistant Professor, Department of Forestry

Title: Calculating Neighborhood Competition of Trees in Pacific Northwest Coast Range by Using the Dendrochronological Data

Abstract: One of the greatest impediments to forestry regarding individual tree competition is that it becomes challenging to devise the optimal competition index. This is because the success of the competition index, which is a numerical expression of the degree of use of the growth potential limited by the genotype of a tree species, will alter depending on stand conditions. The success of a competition index depends on tree species, accessible data, and the structure of the selected model. These competition indices indicate the level of competition for a particular tree. Fundamentally, competition found in forest trees can be categorized into two groups: competition among conspecific individuals, plants of same species, and heterospecific individuals, plants of different species. Literatures focuses on the associations among western hemlock (Tsuga heterophylla (Raf.) Sarg), Douglas fir (Pseudotsuga menziesii (Mirb.) Franco) and red alder (Alnus rubra Bong.), regarding how competition among them affects their growth. To fully understand this mechanism, specifically for growth among those species, long term studies are needed. In this research, data are collected from the production plantations of Lewis and Clark Timberland in the Coast Range mountains of northern Oregon and southern Washington. Using the tree-ring technology, annual growth of Douglas fir, red alder and western hemlock will be tracked. The first objective is to find the effect of competition on individual-tree diameter growth. Specifically, different competition indices for intraspecific and interspecific competition among those species will be calculated. The second objective is to formulate the best fitted model for the diameter growth rate of the trees by using multiple predictor variables. Diameter growth will be formulated with or without competition index as one of the predictor variables. Then, regression models will be developed to predict the diameter growth correctly.

Presenter: Humayun Ahmad

Level of Study: PhD

Category: Engineering

Advisor: Santanu Kundu

Title: Highly stretchable conducting coaxial P3HT composite fiber

Abstract: Conjugated polymers are potential alternatives for wearable electronic devices, where flexibility and stretchability are essential for reliable operation when a user is engaged in physical activity. Although numerous conjugated polymer-based stretchable electronic materials have been proposed, they still experience electrical conductivity variation when mechanically deformed. This study utilized the advantage of the electrospinning technique to enhance the electrical properties of conjugated polymer using a low glass transition temperature elastomer. Here, the fabrication and characterization of highly stretchable electrically conducting poly(3-hexylthiophene) (P3HT) fibers using a coaxial electrospinning technique is reported. This fabrication method combines the stretchability and conductivity of matrix polymer and P3HT, respectively. The elastomer was used as a core, whereas P3HT was used as a shell for making coaxial stretchable fiber. A custom-made tensile tester was developed for determining the mechanical property of the electrospun fiber, and the corresponding electrical conductivity of fiber at different strain conditions were recorded using a newly designed framework. P3HT and BR composite displays highly stretchable fibers with a record high fracture strain above 950%. Electrical conductivity has been found to decrease with increasing strain, and a significant reduction of conductivity was observed above 100% strain. The fiber also shows elastic deformation during the repeated cycle of strain. This investigation of conductive fiber with high stretchability and elastic deformation will contribute to advancing flexible and deformable electronics for wearable applications.

Presenter: Hunter Blalock

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Whitney Crow, Entomology

Title: Insecticide Application Efficacy of sUAS as Compared to Traditional Delivery Systems

Abstract: Small and large uncrewed aerial systems (sUAS and UAS, respectively), also referred to as uncrewed aerial vehicles (or UAVs), have been used for agricultural purposes as technology advances for remote sensing and observing. Needed is an evaluation and expansion of sUAS in agriculture. Treating crops and crop pests with sUAS (UAS weighing less than 24.95 kg (55 lb)) is one way to maximize the use of sUAS in agriculture. This paper will address the efficacy of sUAS insecticide efficacy to control common crop pests of the midsouth region. sUAS application will be compared to self-propelled spray equipment in a variety of crops commonly grown in the midsouth region.

Presenter: Ian Sartorio

Level of Study: PhD

Category: Forest Resources and Veterinary Medicine

Advisor: Bruno Kanieski da Silva, PhD, Forest Management and Economics

Title: Land cover change versus salvage logging: proxies and predictions after hurricane disturbances

Abstract: Hurricanes can cause catastrophic damage to forest lands, leading to an immediate and pronounced impact on the timber supply as salvage logging floods the market with wood. Rapid assessments of forest disturbances are essential to support the planning and management of these events, guiding the decisions of timber market stakeholders and policymakers. To serve this purpose and focused on the short-term timber surplus, we surveyed Hurricane Michael's impact area using remote sensing techniques and evaluated the use of land cover change (LCC) as a proxy to salvage logging in pine plantations. We investigated the main drivers of change and tested statistical models and machine learning algorithms to predict LCC. Most of the modifications to land cover identified under our scope were represented by harvest activities. Intuitively, the storm intensity was the determinant factor of LCC, encompassing wind speed and distance to the hurricane in its estimation. However, ownership type also showed significant contribution to the likelihood of conversion, and the distance to a wood-consuming mill was an important feature for the classification algorithms, indicating the relevance of market and operation-related variables to LCC. The best performance in LCC modeling for Hurricane Michael was achieved by the Random Forest algorithm (65% F1 score), but precision results (58%) indicate an overestimation of the LCC area. This model was unable to accurately predict the LCC for other hurricane events, requiring additional research to develop a generalized model capable of forecasting LCC on unseen data. Acknowledging the limitations of the proposed methodology, this study shows the potential use of land cover change as an indicator of salvage activities after a hurricane. Under this perspective, LCC modeling could be used to anticipate the movements in timber supply and assist the timber market impact assessment.

Presenter: J. Logan Betts

Level of Study: PhD

Category: Engineering

Advisor: Matthew W. Priddy, Assistant Professor, Dept. of Mechanical Engineering

Title: Preliminary development of a high-throughput approach to calibrate finite element heat sources for wire arc additive manufacturing

Abstract: Wire arc additive manufacturing (WAAM) is a metal-based additive manufacturing process, used to create near-net shaped components in a layer-by-layer fashion. WAAM combines a robotic arm with an arc welding source to deposit up to 10 kg/hour, with a 2-3 mm resolution. Unlike traditional robotic welding, WAAM is not a simple process, since all the traditional welding parameters couple with the movement of the robotic arm to produce the deposited weld bead, combining to form the final part geometry. Previously, process parameters for WAAM have been found in a heuristic manner for both experimental and computational efforts. However, finite element (FE) analysis can provide a low-cost method to simulate many process parameters and determine ideal parameters. A high throughput method to calibrate FE heat sources could help widespread adoption of WAAM FE modeling, since process parameters are material- and geometry-dependent, requiring many iterations. This work seeks to outline a full factorial design of experiments of WAAM process parameters and generate a simulation framework to automate a single weld-pass FE simulation. This study controls six parameters to define the length, width, and depth of the weld-bead, element activation, and increment size at three levels each for a total of 729 simulations using the commercially available FE solver, Abaqus. The results will be post-processed to analyze the effects of parameters on the maximum temperature and weld pool evolution at the start, middle and end of the single-pass weld. From this, a statistical model will be implemented to determine how various properties alter the thermal response and determine optimal process parameters for the simulation.

Presenter: Jacie Rinehart

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Kayla Bates-Brantley, Ph.D., BCBA-D, NCSP
Assistant Professor of School Psychology Program Coordinator of School Psychology

Title: Teaching Students with Autism Spectrum Disorder Receptive and Expressive Money Skills

Abstract: The ability to identify and appropriately calculate money is essential for all individuals. There is little research on the use of teaching individuals with autism spectrum disorder (ASD) receptive and expressive money identification and calculation skills. A 15-year-old African American male diagnosed with ASD participated in a money math intervention to teach currency identification and addition. The intervention consisted of presenting the participant with individual coins in conjunction with an error correction procedure until the participant was able to display mastery. Following mastery of individual coins, clinicians increased the field of stimuli with presentation of multiple coins. Results indicated the participant reached mastery in both identifying and calculating coins. This intervention proved to effective in enhancing the participant's ability to identify and calculate coins. The participant should now be providing the correct value of coins or count change after purchasing an item.

Presenter: James Huston Rogers III

Level of Study: Master's

Category: Engineering

Advisor: Dr. Chaomin Luo, Electrical and Computer Engineering

Title: Evaluating Graph-Based Multi-Waypoint Optimization with Node Selection

Abstract: Autonomous multi-waypoint robot navigation is in high demand in real-world robotics applications including search and rescue, disaster response, precision agriculture, and environment exploration. Sellers et al. (2022) proposed a node selection algorithm that generates an optimized path based on distance, time, and safety of the robot and its surroundings as the driving features. This is highly valued in dynamic multi-waypoint environments, such as disaster response and recover efforts. We evaluate the functional capability of this algorithm in a real-world environment with simulated dynamic obstacles utilizing a Clearpath Jackal unmanned ground vehicle with four-wheel drive, GPS, and odometry data, which is equipped with a Velodyne VLP-16 Lidar with one-hundred-meter range and accuracy +\- three centimeters. The environments to be examined are indoor and outdoor, with the environment and obstacles being within the maximum range of the lidar. In this research, our goal is to determine the planning efficient as it correlates from a simulated environment to a real-world environment, particularly in cases of dynamic obstacle avoidance. The node selection algorithm will be validated through ROS-based simulation studies and real-world implementation on our Clearpath Jackal unmanned ground vehicle. The sensor configuration on a variety of robot platforms is presented.

Presenter: James Huston Rogers III

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Chaomin Luo, Electrical and Computer Engineering

Title: Evaluating Graph-Based Multi-Waypoint Optimization with Node Selection

Abstract: Autonomous multi-waypoint robot navigation is in high demand in real-world robotics applications including, precision agriculture, search and rescue, swarm farming, disaster response, and environment exploration. Sellers et al. (2022) proposed a node selection algorithm that generates an optimized path based on distance, time, and safety of the robot and its surroundings as the driving features. This is highly valued in dynamic multi-waypoint environments, such as disaster response, recover efforts, and environment monitoring and evaluation. We evaluate the functional capability of this algorithm in a real-world environment with simulated dynamic obstacles utilizing a Clearpath Jackal unmanned ground vehicle with four wheel drive, GPS, and odometry data, that is equipped with a Velodyne VLP-16 Lidar with one hundred meter range and accuracy +\- three centimeters. The environments to be examined are indoor and outdoor, with the environment and obstacles being within the maximum range of the lidar. Our goal is to determine the planning efficient as it correlates from a simulated environment to a real-world environment, particularly in cases of dynamic obstacle avoidance in this study. The node selection algorithm will be validated through ROS-based simulation studies and real world implementation on our Clearpath Jackal unmanned ground vehicle. The sensor configuration on a variety of robot platforms is presented to implement this algorithm.

Presenter: Jillian Ressler

Level of Study: Master's

Category: Education, Arts and Sciences, and Business

Advisor: Mark Wildmon, School Psychology Assistant Professor

Title: Using a Brief Experimental Analysis to Determine an Effective Reading Intervention

Abstract: Reading Fluency remains the most common difficulty for which children are referred to school psychologists (Bramlett, Murphy, Johnson Wallingsford, & Hall, 2002). Therefore, summer months can be a time of skill loss for students who are already struggling academically, especially when compared to their peers (Schacter, 2003). To help improve this, a summer academic clinic was opened for the month of July at a university-based clinic to help decrease the skill loss in academics. The current study involved two 10-year-old male students that were brought to the summer academic clinic by their parents for help in reading fluency. To help increase the participants reading fluency, a Brief Experimental Analysis was used to quickly determine effective interventions by manipulating instructional variables and assessing immediacy of effect. Brief Experimental Analysis allows researchers to quickly test the relative effects of two or more interventions on a target behavior such as reading oral fluency (Daly, Witt, Martens, & Dool, 1997). Three interventions were used in the BEA, I Read-You Point, Phoneme Go Fish, and Vowel Slide. After each intervention was implemented, a AIMSWEB cold probe was presented to determine Words Read Correctly Per Minute. The results suggest that I Read-You Point is an effective reading intervention method to teach reading fluency skills to individuals with reading difficulties.

Presenter: Josey Webb

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Carley Morrison, Assistant Professor of Agriculture Education, Leadership, Communication with the School of Human Sciences

Title: Is Agriculture Being Implemented in Private School Classrooms? The Impact of Teacher Willingness and Availability of Resources.

Abstract: Most agricultural education research has been primarily conducted in public schools rather than private, leaving a large gap in agricultural education research for those in private school education. Four research objectives guided this study: (1) determine private school teachers' perceived importance of incorporating agricultural awareness activities into Mississippi private school classrooms; (2) identify private school teachers' perceptions regarding issues related to agriculture; (3) identify the extent to which agricultural awareness activities are conducted in Mississippi private school classrooms; (4) determine if correlation existed between Mississippi private school teachers' views on incorporating agriculture, their perceptions of agriculture, and the frequency to which they incorporate agricultural activities into their classroom. The population for this study consisted of Mississippi private school teachers. This study employed a descriptive research design using an ANOVA, a bi-variate correlation, and descriptive statistics. The instrument used for this study was an adaptation of Knobloch's (1997) Agricultural Awareness Survey. Currently, Mississippi private school teachers are not currently incorporating agriculture into their curriculum. Many of them lack agricultural experience and instruction but they are willing to increase their agricultural knowledge and experience through professional development. Almost all the teachers had positive perceptions regarding agriculture and its incorporation into the classroom. Finally, none of the schools reported having an agricultural education program.

Presenter: Josey Webb

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Carley Morrison, Assistant Professor of Agricultural Education, Leadership and Communications with the School of Human Sciences

Title: Plugging into a new age: the impact of social media use on undergraduate students' perceptions of production agriculture and consumer decisions

Abstract: Today, 84% of young adults between the ages of 18-29 use at least one social media site (Pew Research Center, 2020). Adults in this emerging adulthood stage are making their own decisions for the very first time and are likely exploring a variety of options to create their own identity (Arnett, 2000; Vaterlaus). As society becomes more technologically advanced, we become further removed from agriculture (Powell & Agnew, 2011; Dale et al., 2017), resulting in a separation between consumer and producer (Wilson & Lusk, 2020; Holt & Cartmell, 2013). This leads to consumers turning to social media for agriculture information (Eyck, 2000; Holt & Cartmell, 2013; Verbeke, 2005). The consequences of this include potential negative, biased, or false information about agriculture and the creation of negative perceptions of the industry (Eyck, 2000; Holt & Cartmell, 2013; Howard et al., 2017). However, little research has been conducted on the impact social media may have on college students' perceptions of agriculture or their purchasing decisions as a consumer (Howard et al., 2017). This study explores undergraduate students' use of social media and its impact on their perceptions of agriculture and consumer decisions.

Presenter: Josey Webb

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Carley Morrison, Assistant Professor of Agricultural Education, Leadership, and Communications with the School of Human Sciences

Title: Who wants to bring agriculture into their classrooms? An online professional development program.

Abstract: The general population is often not involved with production agriculture and is, therefore, considered to be agriculturally illiterate which impairs their ability to make educated decisions regarding the industry (Kovar & Ball, 2013). And with students being at least three generations removed from the farm, it is important for us to consider the educator's role as they are key to a student's education (Reed Jr. 2019). When students have good teachers, "its impact amounts to an entire year's worth of learning" (Moe, 2011, p.4). Therefore, in order to make agriculture literacy more prevalent in schools, the willingness and interest of the teachers must be taken into consideration. Consequently, we need to know what types of teachers are interested bringing agriculture to their classrooms, and we should know why they are interested in doing so. The Farm to Classroom Program is funded by the USDA NIFA and performed by the School of Human Sciences, with the College of Education, at Mississippi State University. The overall focus of the Farm to Classroom Program is to educate teachers on ways that they can bring agriculture into their classrooms. It is the mission of the project team to institute teacher professional development opportunities to train teachers on how to integrate agricultural education lessons into core curriculum areas. Therefore, it is the purpose of this study to describe the demographics and professional interests of the participating teachers in order to better meet the needs of and understand the types of educators who are wanting to teach agriculture literacy in their classrooms.

Presenter: Kenisha Gordon

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Derris Burnett

Title: Efficacy of Chitosan on Quality and Shelf life of Goat Meat Patties

Abstract: Efficacy of Chitosan on Quality and Shelf life of Goat Meat Patties

In the United States, an increase in the ethnic populations has led to the demand for an alternative protein source, such as goat meat. With the consumer demand for natural preservatives in their foods, chitosan can be used as a natural preservative for goat meat. The multi-functional properties of chitosan, antimicrobial and antioxidant, make it an effective solution to replace current synthetic methods of meat quality and shelf-life. To assess the effectiveness of chitosan on the quality and shelf-life of goat meat patties stored at 4°C for 16 days. The longissimus thoracis muscles of goats fed 12% and 16% sweet feeds were trimmed, ground, and assigned to four treatments: Control (12%), 2.5% Chitosan (12%), Control (16%) and 2.5%-Chitosan (16%) and formed into patties. The aerobically packaged patties were stored at 4 ± 1 °C for 16 days. The physicochemical (pH, color, cook loss and NIR) and microbiological (mesophilic count) properties were assessed intermittently throughout storage. Chitosan increased the pH of the goat meat patties; the 16% chitosan-treated patties had a significantly higher ($p<0.05$) pH of 6.7 than the other treatments (~6.4). Similar cook loss (71% - 90%) was observed for all treatments. The patties with 2.5% chitosan (12% and 16%) had different ($p<0.05$) NIR (fat, moisture, protein, and collagen) results compared to the control treatments. The chitosan treated patties had lower L, a* and b* values compared to the control. Overall, the chitosan treatments (12%-6 Log CFU/g, 16%-8 Log CFU/g) did not improve ($p>0.05$) the microbiological profile when compared to the control (12%-5 Log CFU/g, 16%-7 Log CFU/g). This research provides a practical method in application of chitosan coatings on preservation of goat meat to improve the safety, quality and extend the shelf life. Increased concentrations of chitosan could provide a greater impact on shelf-life extension.

Presenter: Kevin Braman

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Amanda Stone, Associate Professor and Extension Dairy Specialist

Title: Evaluation of time budgets and vaginal temperature of lactating Holstein cows offered a choice of shade and sprinklers on pasture

Abstract: Mitigating heat stress is challenging in pasture environments and knowledge on cow interactions with pasture heat abatement strategies is limited. The study aim was to evaluate cow behavior associated with pasture heat abatement strategies (HAS): 80% shade cloth (SH) and PVC sprinkler systems (SP). Cows (n = 46) were used in a companion study immediately before they entered this study where cows were separated into 2 groups and subject to a crossover design with only 1 HAS. Between studies, cows were housed in freestalls for 3 days due to severe weather. Lactating Holstein cows (n = 46) were assigned to a study pen with both HAS. Cows stayed in this pen for a 1-day acclimation followed by 3 days of observations. A drone was deployed at 30-minute intervals between 1000 to 1430 to evaluate heat abatement use (HAU). Vaginal temperature (VT) was collected at 5-minute intervals. Steps, lying bouts (LB), and time lying (TL) were recorded with a triaxial accelerometer. Temperature humidity index (THI) data was collected. PROC GLIMMIX of SAS was used to evaluate the fixed effect of HAS and THI on HAU, VT, steps, LB, and TL. To determine HAU, data were separated into morning (1000 to 1230) and afternoon (1230 to 1430). All other analyses were separated by HAS. At morning, cattle used SH at THI 71 and 76 ($P < 0.01$ for both) but used SP at THI 79 ($P = 0.04$). At afternoon, cows used SP at THI 77 ($P < 0.01$) but SH at THI 80 ($P < 0.01$). Cows with the greatest VT in the afternoon used SP more than SH or no HAU ($P < 0.01$ for both). Cows using SH had decreased VT ($P < 0.01$) whereas cows with minimal HAU had greater VT ($P < 0.01$). Cows at lower THI with increased VT in both HAS and no HAU had increased lying bouts ($P < 0.01$ for all). Cows not using HAS had increased steps ($P < 0.01$) compared to cows with either HAU. At lower VT x LB, cows using both HAS as well as no HAU all spent more time standing ($P < 0.01$ for all). Given the choice, cows used both SH and SP systems on pasture. As THI fluctuates throughout the day, cows will alter HAU. The HAS used by cows on pasture influenced their VT and daily time budgets.

Presenter: Loan Nguyen

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Steven Gwaltney, Chemistry Department

Title: Designing Carbonic Anhydrase Inhibitors: Experimentalism and chemistry insight based Molecular Dynamic Simulation

Abstract: The binding of inhibitors to human Carbonic Anhydrase II (hCAII) was investigated using molecular modeling and biophysical characterization techniques, including Circular Dichroism (CD) and Isothermal Titration Calorimetry (ITC). Ligands were optimized using Spartan20 with B3LYP/6-31G* method and the protein structure was purified from the Protein Data Bank using H++ service. AutoDock 4.0 was used to determine the binding pocket and orientation of the inhibitors, and Molecular Mechanics Poisson-Boltzmann/Generalized Born Surface Area (MMPB/GBSA) calculations were used to calculate free binding energy and dominant interaction types. Calculational results showed that all four ligands, cox, Q8ASA, PiQ8ASA, and PaQ8ASA, remained stable at the active site of hCAII, dominated by van der Waals and electrostatic interactions. Q8ASA formed strong face-to-face stacking with Phe128, while Pi8AQSA and Pa8AQSA formed H-bonds with hydrophobic residues at the active site. On the other hand, six new inhibitors, including benzene sulfonamides, 2NO2 Sulfonamide, o-Aminobenzene Sulfonamide, m-Aminobenzene Sulfonamide, p-Aminobenzene Sulfonamide, and p-DAFO Sulfonamide, were synthesized and characterized by ITC, with all binding to Zn of hCAII favorably as shown by ΔG energy. CD data showed that the protein structure changed significantly when o-Aminobenzene Sulfonamide was bound to Zn. Further studies are ongoing to fully understand the binding behavior of the inhibitors.

Presenter: Luke Jackson Tucker

Level of Study: PhD

Category: Engineering

Advisor: Dr. Lauren Priddy, Associate Professor, ABE

Title: Chitosan hydrogel and poly lactic acid particles loaded with fosfomycin for localized treatment of osteomyelitis

Abstract: Chronic osteomyelitis is a painful and persistent infection of the bone. To combat osteomyelitis, the infected tissue is removed, and systemic antibiotics are administered for two to six months, which can cause systemic toxicity and increase the risk of new antibiotic-resistant bacteria. To address this challenge, we developed a local delivery system for fosfomycin antibiotic: an injectable, antimicrobial chitosan hydrogel and/or polylactic acid (PLA) particles, a bioresorbable polymer used to prolong the availability of fosfomycin. The chitosan hydrogels were either left blank or loaded with: (i) fosfomycin, (ii) PLA + fosfomycin, or (iii) a combination of fosfomycin and PLA + fosfomycin (combo) and tested against Staphylococcus aureus (S. aureus) in vitro and in vivo. In a modified Kirby Bauer, planktonic, and biofilm assays, the addition of chitosan helped retain the antibiotic and increase inhibition compared to fosfomycin-loaded phosphate-buffered saline. The biomaterials were then used to treat implant-related osteomyelitis in the rat, where blood haptoglobin concentration and defect area were used to longitudinally monitor disease progression. There were differences between treatment groups for both longitudinal measures. Haptoglobin levels were higher in the chitosan-only group compared to all antibiotic-containing groups with the combo group almost being significantly lower than group ii. The defect area increased from day 8 to all other days and treatment differences were seen at day 35 between chitosan and groups i and iii. Ex vivo bacterial load in bone and soft tissue was significantly lower in all fosfomycin-containing groups in the bone tissue and the combo group was lower than chitosan in the surrounding soft tissue. This material could have great potential in treating chronic infections and other localized diseases in both human and animal medicine. Future testing of the material will include using a large animal model of osteomyelitis to get one step closer to a new treatment vehicle.

Presenter: M M Nabi

Level of Study: PhD

Category: Engineering

Advisor: Dr. Ali Gurbuz

Title: Deep-learning based Global Soil Moisture estimation using CYGNSS Delay Doppler Maps

Abstract: Soil moisture estimation using remote sensing is becoming increasingly popular. Several satellite missions have been launched in order to collect soil moisture from the earth's surface. The main challenge, however, is obtaining soil moisture at higher spatial and temporal resolution. However, GNSS signals at the L-band frequency can reflect off the land surface and provide high-resolution land surface information, including surface soil moisture. Delay-Doppler Maps (DDMs) containing important earth surface information are generated by the Cyclone Global Navigation Satellite System (CYGNSS) constellation from GNSS reflection measurements. CYGNSS is designed to measure the ocean surface wind field with unprecedented temporal and spatial resolution under all precipitation conditions and across the entire dynamic range of wind speeds encountered in a tropical cyclone. A new deep-learning algorithm is proposed to determine complex relationships between the reflected measurements and surface parameters which can provide improved soil moisture estimation. The model is trained and validated using the Soil Moisture Active Passive (SMAP) mission's enhanced SM products. The developed model is able to provide global surface soil moisture products at a daily 9 km resolution.

Presenter: Macy Gosselaar

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Austin Himes, Department of Forestry, Dr. Daniel Peterson, Director of IGBB, Dr. Heidi Renninger, Department of Forestry, Dr. Courtney Siegert, Department of Forestry

Title: Impact of Differentially Expressed Genes in Monoclonal and Polyclonal Plantings of Populus deltoides for Agricultural Nitrogen Mitigation

Abstract: Excessive nitrogen run off from agricultural operations can cause the eutrophication of the Northern Gulf of Mexico. Contaminated groundwater and surface runoff from the southeast region of the United States flow into the lower Mississippi River Basin, causing excessive growth of algal blooms, hypoxic conditions, and deteriorating the quality of water. Populus deltoides, known as a short rotation woody crop (SRWC), and a carbon neutral fuel with high cellulose and low lignin contents, can quickly produce large quantities of biomass and easily be converted into biofuels to produce bioenergy. When planted in riparian areas, Populus deltoides could mitigate and intercept excessive nitrogen runoff. Polyclonal plantings of Populus spp. are expected to display an increase site resource utilization, growth through differentiated root system sorption zones (i.e niche differentiation) and crown/canopy structures, increasing the efficacy of Populus spp. ability to intercept and mitigate excessive nitrogen. However, underlying molecular mechanisms of niche differentiation, including changes in site resource utilization and growth of Polyclonal Populus plantings in the southeast region of the United States are poorly understood. For this project, we will determine if differentially expressed genes (DEGs) are an underlying molecular mechanism of niche differentiation. This study will observe DEGs of Populus clones S7C8, 110412 and an even mixture of these two clones through mRNA-directional sequencing of leaf tissue. We expect our two varieties of Populus deltoides in polyclonal plantings will show greater regulation of gene expression compared to our two varieties planted in monocultures. We expect changes in concentrations of measured inorganic forms of nitrogen from our groundwater samples along with phenotypic measurements will support increased DEG activity in Polyclonal plantings. A better understanding of morphological and physiological variability in Populus deltoides could aid in developing genomic-based tools/approaches to better predict what combinations of varieties will provide the greatest growth and nitrogen mitigation potential for future plantings.

Presenter: Macy Gosselaar

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Austin Himes, Department of Forestry, Dr. Daniel Peterson, Director of IGBB, Dr. Heidi Renninger, Department of Forestry, Dr. Courtney Siegert, Department of Forestry

Title: Impact of Differentially Expressed Genes in Monoclonal and Polyclonal Plantings of Populus deltoides for Agricultural Nitrogen Mitigation

Abstract: Excessive nitrogen run off from agricultural operations can cause the eutrophication of the Northern Gulf of Mexico. Contaminated groundwater and surface runoff from the southeast region of the United States flow into the lower Mississippi River Basin, causing excessive growth of algal blooms, hypoxic conditions, and deteriorating the quality of water. Populus deltoides, known as a short rotation woody crop (SRWC), and a carbon neutral fuel with high cellulose and low lignin contents, can quickly produce large quantities of biomass and easily be converted into biofuels to produce bioenergy. When planted in riparian areas, Populus deltoides could mitigate and intercept excessive nitrogen runoff. Polyclonal plantings of Populus spp. are expected to display an increase site resource utilization, growth through differentiated root system sorption zones (i.e niche differentiation) and crown/canopy structures, increasing the efficacy of Populus spp. ability to intercept and mitigate excessive nitrogen. However, underlying molecular mechanisms of niche differentiation, including changes in site resource utilization and growth of Polyclonal Populus plantings in the southeast region of the United States are poorly understood. For this project, we will determine if differentially expressed genes (DEGs) are an underlying molecular mechanism of niche differentiation. This study will observe DEGs of Populus clones S7C8, 110412 and an even mixture of these two clones through mRNA-directional sequencing of leaf tissue. We expect our two varieties of Populus deltoides in polyclonal plantings will show greater regulation of gene expression compared to our two varieties planted in monocultures. We expect changes in concentrations of measured inorganic forms of nitrogen from our groundwater samples along with phenotypic measurements will support increased DEG activity in Polyclonal plantings. A better understanding of morphological and physiological variability in Populus deltoides could aid in developing genomic-based tools/approaches to better predict what combinations of varieties will provide the greatest growth and nitrogen mitigation potential for future plantings.

Presenter: Madalyn Stoecker

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Kristine O. Evans, Assistant Professor, Wildlife Fisheries and Aquaculture

Title: Forest Structure and Edge Effects on Bee Functional Diversity in Working Pine Forests

Abstract: Working forests provide unique opportunities for biodiversity research, conservation, and management. At the landscape scale, working forests consist of a mosaic of different forest stands with structural characteristics that support unique native bee communities. Additionally, stands are often separated by roads, where roadside edges may provide resources and corridors for bee travel. In this study, we aim to evaluate how functional bee (Hymenoptera: Apoidea: Anthophila) diversity responds to landscape heterogeneity. During the summer of 2022, we collected bee specimens and vegetation structural data on landscapes dominated by working loblolly pine (Pinus taeda) forests in east-Mississippi and west-Alabama. We sampled three stand age categories: early-successional (0-3 years), pre-thinned (~4 years to thinning at 15 years of age), and mid-rotation, thinned (approximately 15+ years old). We conducted plant and pollinator surveys at 0m, 50m, and 100m distances into each stand, situated perpendicular to roadsides. Bees were identified to species and categorized according to life history traits (such as nesting location, size, and sociality) to calculate functional diversity. We will analyze functional diversity in relation to stand age, adjacent stand age, distance from edge, and localized habitat characteristics. We expect functional traits to differ by stand age (e.g., proportion of wood-nesting bees changing as stand age class changes). Biodiversity indices are likely to differ along the distance-from-edge gradient, becoming less diverse as distance increases. If our predictions are supported, conservation of native bee communities may be achieved best at the landscape scale across a mosaic of stand conditions. Forest managers may incorporate such findings into management plans targeting biodiversity goals with sustainable forest management.

Presenter: Mahathir Mohammad Bappy

Level of Study: PhD

Category: Engineering

Advisor: Dr. Wenmeng Tian

Title: Evaluation of Design Information Disclosure through Thermal Feature Extraction in Metal based Additive Manufacturing

Abstract: Manufacturing-as-a-Service (MaaS) can accelerate additive manufacturing (AM) process-defect modeling by augmenting training data to all collaborating users via a data sharing network. However, sharing process data may disclose product design information. This paper aims to evaluate design information disclosure of various thermal history-based feature extraction methods for metal-based AM anomaly detection. This is accomplished by evaluating the design information (i.e., printing orientation) retained, and the overall data usability (i.e., anomaly detection) preserved in the extracted features for various state-of-the-art feature extraction methods. The evaluation results indicate that there are urgent needs in privacy preserving data sharing for additive MaaS (AMaaS).

Presenter: Maitreyee Rawat

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Keith T Hollis

Title: Synthesis, Characterization of achiral and chiral CCC-NHC-Ir(III) pincer complexes for C-H functionalization of Indoles with Diazoacetates

Abstract: Since the discovery of N-heterocyclic carbenes (NHCs) as a stable carbene, several classes of NHC have been synthesized, and their application as a ligand in metal complexes has received much attention due to strong σ-donor with deficient π-acceptor nature. Our group synthesized the first CCC-NHC zirconium amido pincer complex in 2005. Herein we report the synthesis of the first chiral and achiral CCC-NHC Ir pincer complexes synthesized by following metalation and transmetalation methodology. The achiral CCC-NHC Ir(III) has an efficient catalytic application in the C-H functionalization of N-methyl indoles with diazoacetates. In this catalytic reaction, 3 mol % of Ir catalyst loading was used to synthesize various optically active indole derivatives bearing chiral functional groups at the C-3 position. The substrate scope and limitations of N-methyl indoles and diazoacetates were also briefly explored.

Presenter: Mallie Donald

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Hailey Ripple, Department of Counseling, Educational Psychology, and Foundations

Title: Stimulus Fading to Enhance College Building Recognition

Abstract: Emerging college transition programs develop functional life skills and prepare individuals with intellectual and developmental disabilities for employment opportunities, thus increasing satisfaction during adulthood (Price et al., 2018). Transition programs note the importance of on-campus attendance but acquiring campus navigation skills can be difficult. Stimulus fading is an intervention that teaches skill acquisition for functional skills (Cooper et al., 2020), but has rarely been implemented in a virtual setting (Fischer et al., 2019). The current study involved one 19-year-old male with autism spectrum disorder who was accepted into a transition program in the southeastern United States. To increase the participant's recognition of campus buildings, stimulus fading on 2-and 3-second prompt delays was used to teach building names. Further, a PowerPoint with pictures of 10 common buildings on campus was used and the name of each building was faded in to correctly pair the building with the name. The percentage of correctly identified buildings was visually observed with an increase in percentage correct that remained stable through intervention and generalization phases. The results suggest that stimulus fading is an effective method to teach building recognition for individuals with disabilities.

Presenter: Mateus Sanquetta

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Bruno Kanieski da Silva, Assistant Professor, Department of Forestry

Title: Modeling and forecasting pine sawtimber stumpage prices in southern US

Abstract: Timber return is composed of three main drivers, forest growth and yield, timber price, and land price. Forest growth and yield are stressed by literature in a wide range of models for different ecosystems, while land prices are related to inflation. Not having accurate predictions of timber prices over time for different regional timber markets affect optimal deterministic rotation. Consequently, affecting the periodic dividends and the decision-making process regarding strategies of timber production for each region to improve timber return. To overcome this problem, we evaluated time series methods applied to real pine sawtimber stumpage quarterly prices in timber regions across the southern US. Pine sawtimber stumpage prices from different timber regions in the southern US were used for the 1977-2022 period. To provide a framework of how the time series methods behave with price prediction, we used the univariate autoregressive integrated moving average (ARIMA) as the benchmark. Hence, it was possible to compare the performance of each modeling approach for in-sample and out-sample price forecasts. The results of this study proved to be very useful for timberland shareholders and investors.

Presenter: Matthew Register

Level of Study: PhD

Category: Engineering

Advisor: Dr. Matthew W. Priddy, Assistant Professor and Teaching Coordinator, Department of Mechanical Engineering

Title: Effects on residual stress due to thermal property input of low carbon steel in finite element modeling of the WAAM process

Abstract: Finite element (FE) thermomechanical simulations of the wire arc additive manufacturing (WAAM) process have been widely used to predict the temperature history and resultant residual stresses in as-built parts. Temperature-dependent thermal properties like density, conductivity, specific heat, and latent heat are required to accurately simulate the solidus-to-liquidus transition, which is one important factor in the formation of residual stress and distortion. Current research has shown that thermal properties measured experimentally or simulated using material database software can be used for thermal modeling; however, there has been no direct comparison showing which thermal properties are most appropriate for mechanical WAAM modeling. The focus of this research is to determine how thermal property input effects the FE predicted residual stress and distortion for a low carbon steel. The thermal history for thin wall builds is compared with differing temperature-dependent thermal properties to examine the relationship between thermal properties and the resultant residual stresses. It was shown that constant values at room temperature result in an increased maximum temperature for WAAM thermal simulations and linearized properties decreased the maximum temperature when both were compared with the experimental thermal property inputs. To improve the fidelity of WAAM mechanical modeling, further work will look to establish how these varying thermal histories effect the mechanical response of the as-built part.

Presenter: Melika Kooshki Forooshani

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Mary Nelson Robertson, PhD, CHES, Assistant Professor, School of Human Sciences

Title: Rural Mississippians' perceptions of primary healthcare trustworthiness when dealing with a mental health challenge: Age, gender, and racial differences

Abstract: Rural residents in the U.S. are experiencing notable disparities in mental health outcomes, while mental illness has the same prevalence in rural and urban areas. In an effort to find the roots of mental health disparities in rural Mississippi, we examined Mississippians' perceptions of using primary healthcare providers (PCP) as mental health resources. Rural Mississippi adults were recruited by a Morning Consult panel and project team members at two state-level conferences to participate in a 147-item web-based survey between October 2021 and January 2022. The survey assessed adults' perceptions of fostering mental health, mental health resources, community mental health, COVID-19, and opioid use, and the demographic characteristics of participants. Univariate and bivariate analyses were conducted. In total, 274 Mississippi rural residents completed the questionnaire survey. The majority of participants identified as male (51.5%), white (76.3%), having less than a college degree (69.3%), and being employed in the private sector (21.5%). More than a third of participants reported being in the age range of 18 years to 34 years (35%). Results suggest that participants' perceived trustworthiness in receiving information on mental health from a PCP is positively associated with participants' perceived likelihood to seek help from a PCP if experiencing a mental health challenge and perceived comfort with engaging in a conversation about mental health with a PCP. Moreover, significant demographic differences in terms of gender, age, and race for both perceived trustworthiness and perceived comfort were recorded, which can lead our future outreach efforts towards the groups that are more vulnerable to a mental health challenge and less likely to seek help for it. These findings can inform future interventions that disseminate educational tools to improve the trustworthiness of PCPs and facilitate the willingness of rural residents to seek care from PCPs.

Presenter: Michaela Patoilo, M.S.

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Ben Porter, Ph.D., Assistant Professor, Psychology Department

Title: Head Injury and Executive Functioning in the MIDUS Cohort

Abstract: It has been well established that sustaining a head injury can result in cognitive impairments, but there is little research on head injuries within middle-aged and older adults. Given the most common samples for head trauma research are athletes and military service members, most of the individuals are under 35 years old. It is important to extend this research to older samples because greater lengths of time may have passed post-injury, potentially influencing findings. Additionally, research indicates that head injuries can lead to measurable executive functioning (EF) difficulties – a domain previously established as susceptible to cognitive ageing-related decline. Therefore, the current study investigates the connection between prior head trauma and EF in middle-aged and older adult participants. 1150 participants from the 2nd wave of the Midlife in the United States cohort (MIDUS) and 801 participants of the MIDUS refresher panel were included. Participants reported their number of previous head injuries, whether they were hospitalized, and when the injuries occurred. Participants also completed cognitive testing, combined into a single Z-score to measure EF. Regression was used to evaluate the association between self-reported head trauma and EF, controlling for age and gender. Post hoc analyses examined hospitalization and recency of head injury. History of head trauma was not associated with lower levels of EF ($F[3,1945]=2.68$, $p=.38$). Furthermore, EF was not associated with hospitalization ($b=-.04$, $p=.31$) or recent head injuries ($b=-.04$, $p=.70$). These results do not support a link between decreased EF and previous head injury in middle-aged and older adults, inconsistent with earlier literature. It is important to consider, however, that the operationalization of EF produces significant debate. Therefore, conclusions from the present study solely apply to head trauma and EF, specifically as assessed by the current definition and measures. The present analyses were limited by the broad inclusion of all head injuries rather than a more narrowed scope. However, the study had the advantage of a large sample size providing adequate power. The current results suggest that additional research is needed within middle-aged and older adult samples to investigate possible connections between head trauma and EF using alternate definitions and assessments.

Presenter: Molly Friend

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Molly Nicodemus, Associate Professor Animal and Dairy Science

Title: Physiology of human-horse coupling: Horses reflect cortisol concentrations in residential substance abuse treatment program patients experiencing withdrawal while participating in equine interaction

Abstract: Psychotherapy utilizing equine interaction as a therapeutic tool is emerging as an effective treatment option for substance use disorder (SUD) due to benefits it presents over traditional therapeutic interventions. Research has found improvements in treatment retention, confidence, emotional stability, communication skills, and patient-therapist alliances resulting from this intervention. Improvements in these measures are associated with decreases in prolonged cortisol concentrations. Preliminary studies investigating cortisol concentrations during equine interaction indicate this treatment decreases cortisol concentrations, suggesting this change as a mechanism of the efficacy of this therapy in SUD treatment. Additionally, limited research is available concerning human-equine cortisol synchronization during equine interactive sessions. Therefore, the purpose of this study was to investigate the impact of psychotherapy incorporating equine interaction on salivary cortisol concentrations in SUD patients during withdrawal and to determine synchronization of salivary cortisol concentrations in human-horse participants during this therapeutic process. Salivary samples were collected from a population of residential SUD patients (n=18) and therapy horses (n=4) on weeks 1, 2, and 4 of the treatment program. Concentrations of cortisol were determined using a commercially available ELISA. Treatment, week, and treatment by week interaction were analyzed using the MIXED procedure in SAS with significance considered at $P \leq 0.05$. Furthermore, spearman's correlations were analyzed to determine the relationship between human and horse cortisol values. A week by treatment interaction ($P = 0.04$) was observed in which cortisol concentrations were not varied in weeks two and four of treatment, but the equine interaction increased cortisol concentrations in week one. Additionally, a strong negative correlation (-0.90, $P \leq 0.01$) was found between the change in human and horse cortisol concentrations over the course of the equine interaction in the second week. Results indicate the efficacy of residential psychotherapy programs that incorporate equine interaction during the withdrawal process of substance abuse. Furthermore, correlative data indicate the impact human stress levels may have on horses within this therapeutic setting. These results offer a deeper understanding of equine interaction, but further research is needed to understand its value as an intervention for SUD patients experiencing withdrawal.

Presenter: Moshood Fagbolade

Level of Study: Master's

Category: Education, Arts and Sciences, and Business

Advisor: Dr Donna Gordon, Department of Biological Sciences

Title: A genetic complementation approach examining occidiofungin targeting of fungal actin orthologs using the S. cerevisiae shuffle strategy

Abstract: Occidiofungin is cyclic glycolipopeptide produced by the soil bacterium Burkolderia contaminans MS14 with demonstrated fungicidal activity against yeast and filamentous fungi of clinical and agricultural importance. Recent studies have identified the cytoskeletal protein actin, as its biological target. ACT1 is an essential gene as it codes for the sole form of actin with roles in endocytosis, nuclear positioning, and polarized cell growth. Despite the high degree of amino acid conservation between fungal actin proteins (>90%), sensitivity to occidiofungin has been shown to vary. For example, the minimum inhibitory concentration (MIC) for C. albicans is 2-4-fold higher than that of S. cerevisiae, while F. oxysporum and P. digitatum require >10-fold higher levels of the antifungal compound. This study seeks to determine whether the amino acid differences between the fungal actin proteins are directly responsible for the differences in susceptibility to occidiofungin. The functionality of actin gene products from C. albicans, F. oxysporum, and P. digitatum are assessed in a haploid S. cerevisiae ACT1 shuffle strain. Actin genes from F. oxysporum and P. digitatum, were codon optimized for expression in S. cerevisiae, and then examined for functional complementation by measuring growth kinetics, cellular bud morphology, nuclear positioning, and actin protein expression levels. Data for susceptibility testing to occidiofungin by MIC indicates a similar sensitivity profile as cells expressing ACT1 from S. cerevisiae. These findings suggest that the amino acid differences in the actin protein for these fungal organisms are not directly linked to the reduced susceptibility to occidiofungin, and that other cellular factors are likely responsible for such differences.

Presenter: Nasir Qadir

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Bruno Kanieski da Silva, Assistant professor of Forest Management and Economics

Title: An optimization model for assessing the impact of carbon offset programs in timberland assets

Abstract: In the last decades, the carbon market has become a promising alternative to the current poor timber prices practices in the US South. However, it is not very clear what is the impact of a carbon offset program on long-term forest management. We gathered information about the yield curve, cost, and prices to build a harvest schedule model based on profit maximization in a multi-stand timberland asset. After estimating the optimal rotation ages, we imposed a harvest constraint in the first rotation to simulate one-year carbon offset contracts. Under three different site productivity, our results indicate that imposing a one-year carbon constraint will change the silvicultural interventions in future rotations, thereby reducing the financial returns. Landowners must be compensated from $16.90 to $23.53 per acre for a one-year carbon offset contract. Our findings can support public and private decision-makers to estimate the impact of carbon-offset projects on timber supply and forest conservation. In addition, landowners can better evaluate their economic and ecological trade-offs when applying for such programs.

Presenter: Nathan Smith

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Anne Marshall, Associate Professor Department of History

Title: Laboring from Sea Castle to Brava Centauri: Work on Display at Disney's Future City in the 1980s

Abstract: On October 1, 1982, Walt Disney World opened the gates to its second theme park. In contrast with earlier Disney parks where visitors discovered fantastical lands, or a mythologized American frontier, guests at EPCOT Center explored pavilions dedicated to the nations of the world and celebrating human innovation. This paper examines the narratives on display within Disney's permanent world's fair and places them within the larger context of the US transition to a neoliberal economy throughout the 1980s. Further, it reveals the struggle for the Disney unions to continue to win concessions from the company in a post-PATCO landscape.

Presenter: Notsile Dlamini

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr Jean M.N. Feugang, Associate Professor, Department of Animal and Dairy Sciences

Title: Profiling boar semen quality through near-infrared spectroscopy and proteomic tools

Abstract: Artificial insemination (AI) is the leading reproductive tool used in the swine industry. However, AI faces challenges due to the lack of reliable predictors of semen quality. Seminal plasma (SP), a protective biofluid for spermatozoa, may constitute a great reservoir for detecting reliable non-invasive biomarkers of sperm quality. SP is composed of membranous vesicles called extracellular vesicles (EVs), whose roles in semen quality remain unfolded. These EVs contain various biomolecules, such as proteins, which can affect semen quality. Near-infrared spectroscopy (NIRS) is a nondestructive tool capable of predicting semen quality effortlessly. Thus, this study aimed to investigate NIRS on SP with different semen quality status and determine SP-EVs' proteomic profile. Fresh semen was collected (n=75) from sexually mature Duroc boars. Semen was subjected to sperm analyses (motility and morphology) and subsequently classified as poor-quality or good-quality based on assessment criteria cut-offs (<70% and ≥70%, respectively). Thereafter, individual semen samples were subjected to serial centrifugation to isolate SP and spermatozoa. Aliquots of SP were used for NIRS analysis measured using ASD FieldSpec®3 portable spectrometer - 1 mm quartz cuvettes, and other subsets of SP were ultracentrifuged to isolate EVs for proteomic analysis. Changes were explicitly observed in water structures at coordinates C1, C5, and C12 (nm), corresponding to water associations with chaotropic solutes (water asymmetrical stretching vibrations-v3), free water, and kosmotropic solutes (increased H-bonding numbers and strength), respectively. The PCA-LDA analysis revealed high accuracy (92.2%), sensitivity (94.2%), and specificity (90.3%). Totals of 364 and 325 proteins were identified in poor-quality and good-quality SP-EV samples, respectively. Of these, five proteins (nexin-1, seminal plasma protein pB1 precursor, lectin, galactoside-binding, soluble, 3 binding protein, keratin, type II cytoskeletal 6A and IgGFc-binding protein) were differentially expressed in both SP-EV samples. Unique proteins in the good-quality SP-EVs were associated with sperm functionality, semen quality, and immune response. In conclusion, NIR spectroscopy identified biochemical differences in boar SP with divergent quality status. Differentially expressed SP-EV proteins could be potential biomarkers for sperm quality and fertility thus, the selection of boars associated with high-quality semen could benefit the swine industry by increasing production and profitability.

Presenter: Oluwaseyi Olomitutu

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Michael J. Mulvaney, Department of Plant and Soil Sciences

Title: How fast can we plant soybean in Mississippi?

Abstract: Mississippi (MS) soybean producers are under pressure to plant as much acreage as possible within narrow planting windows. The five-year average planting progress of MS soybean acreage is 44% during the optimal soybean planting window (April 10-May 1), after which yield declines at 0.4 bu/ac/day, or $6.12/ac/day (at $12/bu). New metering and seed delivery technology claims to allow faster planting (up to 19 kph) without sacrificing seed singulation, stand, or yield, but these tools need to be validated under MS conditions before recommending them to producers. Our objective was to quantify soybean response at different planting speeds using mechanical vs. precision planting technology. Two planters were tested: a traditional ground-driven mechanical planter and a precision planter equipped with variable rate downforce, electronic metering, and high-speed seed tube planting technology from Ag Leader®. The planters were tested at speeds of 7.9, 10.8, 13.6, 15.5 kph (actual speed). The trial was repeated at five locations with four replications during 2022, but only three will be presented: Brooksville (clay), Starkville (loam), and Verona (clay loam). Local seed 4795XS was planted in plots measuring four rows × ≥46 m long. Data collection included stand count, stand variability, and yield in the middle 10.7 m × two rows of each plot. Data were subjected to ANOVA at α=0.05 (LSD). Regardless of planter, increased planting speed resulted in increased plant spacing and in-row variability and decreased plant populations. Increased speed did not affect yield or return on investment. Preliminary results will be validated during two more planting seasons using both soybean and corn.

Presenter: Orlandria D. Beamon

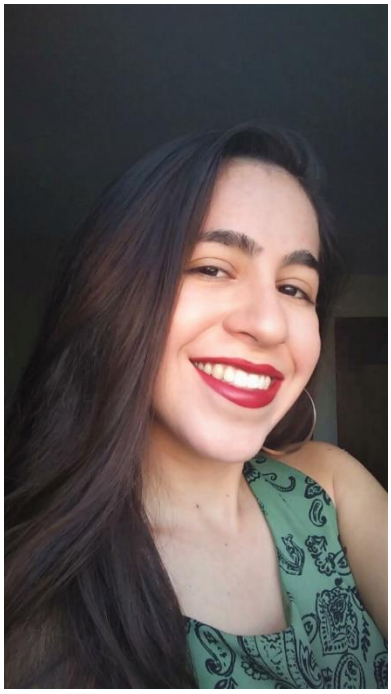
Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Mark E. Wildmon, PhD, BCBA-D; Department of Counseling, Educational Psychology, and Foundations

Title: Using Antecedent Interventions to Increase Oral Reading Fluency

Abstract: Antecedent-based interventions have been well established in the research literature in addressing problem behaviors in children and adolescents. These procedures are primarily concerned with the effectiveness of antecedent interventions in reducing problem behaviors in children and adolescents with atypical development. Concerning academic issues, considerable evidence indicates a decline in motivation and academic performance for many students as they progress from elementary to middle and high school. However, few studies have examined the effects of antecedent interventions in enhancing academic achievement. Consequently, the purpose of this study was to use the standards of What Works Clearinghouse to determine the effectiveness of using an If-then board with a reinforcement menu to increase oral reading fluency in a high school aged participant. This study was conducted using an ABAB design. The researcher hypothesized that the antecedent plus reinforcement phase would have the most significant level of impact. Results of the study revealed an effect size of 1.00 when examining the impact of using an antecedent-based intervention paired with reinforcement. Implications of the study suggest that antecedent interventions alone may not produce significant changes in high school students' academic performance. However, oral reading fluency is improved by this process when it is combined with reinforcement.



Presenter: Patricia Marie Cordero-Irizarry

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Donna Peterson, Extension Professor and Program Leader, School of Human Sciences

Title: Cool Learning Needs Clear Expectations!

Abstract: Asynchronous courses have proliferated amidst the Covid-19 pandemic. Many students prefer the flexibility of these courses because it gives them the liberty of distributing time on their terms. However, the key to students' success in this unconventional format relies on the clarity of course expectations and the instructors' timely feedback. As a result of the pandemic, we restructured a 16-week, face-to-face presentation-heavy course to be delivered asynchronously online, during a new 5-week term offered over the winter break, to meet the needs of students who are unable to attend class in a traditional manner. One challenge for the students enrolled lies in balancing the workload with the holiday festivities. Therefore, we focused on building rapport with them by sending weekly assignments reminders and tips for success, and individually contacting students to help keep them on track. The course was designed to guide students with modules and assignment instructions pre-uploaded. Each weekly module was structured in two sections, the first contained all resources needed to successfully complete the assignments for that week, and the second contained all assignments required to complete the module requirements. Moreover, students were required to interact with each component of the individual module for the next module to be accessed. Assignments were thoroughly detailed, strategically timed, and graded with abundant feedback. The successful delivery of the course is supported by positive student comments stating that the instructors were, "great at grading assignments in a timely manner with plenty of feedback to improve…work". We encourage faculty who are transitioning into asynchronous delivery to consider this format as the "setup worked perfectly. It was easy to navigate in Canvas and made it easy to know what was expected". If we want our students to succeed, it is crucial that we clearly communicate what is expected.

Presenter: Patrick Camacho

Level of Study: Master's

Category: Engineering

Advisor: Dr. Matthew Priddy, Department of Mechanical Engineering

Title: Simulation-based comparison of the electromagnetic response of a laminar and heterogeneous multi-phase material

Abstract: A growing area of investigation is the application of electromagnetic (EM) analysis of structural materials, for it has significant potential in non-destructive testing and characterization. Studies have demonstrated the application of EM analysis for detecting and locating materials or objects within the structures by identifying the depth at which EM signatures change. Studies have shown the possibility of such methods to locate faults, defects, corrosion, and inclusions in a structure. However, previous experimental studies simplified the multi-phase structural material as a laminar structure where each constituent material formed its own distinctive layer. While conclusions from such experimental studies were effective in detecting and locating changes in material, the method of modeling heterogeneous, multi-phase structures were not representative of realistic material composition. The goal of this study was to evaluate and compare the electromagnetic signatures from microwave illumination of the two styles of structures (laminar and heterogeneous) and determine the effects on their EM responses. To achieve this goal, a laminar and a particulate-matrix model were created. Both models were compositionally equivalent with respect to the volume fractions of the same constituent materials. This study simulated hyperspectral EM analysis of the models. The scattering parameters produced by the simulation were considered the EM signatures to evaluate and compare the two styles of models.

Presenter: Phong Phan

Level of Study: PhD

Category: Engineering

Advisor: David Vandenheever, Associated Professor - Department of Agricultural & Biological Engineering

Title: Electroencephalography and biomechanics of the basketball free throw

Abstract: According to various studies, compared with novice athletes, experts exhibit superior integration of perceptual (e.g. quiet eye – eye fixation on target prior to motion), cognitive (e.g., sense of distance), and motor skills (e.g. movement control). This superior ability has been associated with the focused and efficient organization of task-related neural networks. Specifically, skilled individuals demonstrate a spatially localized or relatively lower response in brain activity, characterized as 'neural efficiency', when performing within their domain of expertise. Besides, previous works also suggested that elite basketball players can predict successful free throws more rapidly and accurately based on cues from body kinematics, which might be due to a long training of specific motor skills (e.g. basketball free throw) and associated with focused excitability of the motor cortex during the reaction, movement planning and execution phases. Thus, utilization of electroencephalography (EEG) and motion capture system (MoCap) can provide a deeper understanding of the relationship between neurophysiological activity and human biomechanics as well as their effects on the success rate of the motor skill. Additionally, there were no previous studies that combined both EEG and MoCap systems to analyze the performance of the subjects during specific motor skill execution. The reason might be to avoid motion artifacts occurring during movement initiation and execution. However, our protocol will ensure the subjects remain stable and avoid making sudden moves, which helps to fully capture the EEG signals during the movement planning step prior to movement initiation. As a result, by utilizing the recorded EEG signals and MoCap data of 16 participants, each performing 50 basketball free throws, this study aims to analyze the athlete's biomechanical and neurological parameters during movement execution to evaluate its effect on shot accuracy. The study can be a practical approach in analyzing the sources that lead to better elite athletes' performance in various sport-related tasks. Moreover, the acquired data can contribute to a deeper understanding of the connection between the mental and physical states of elite athletes during successful outcomes, thus, providing vital information for the overall improvement of athletic performance and guidance for sport-specific training needs.

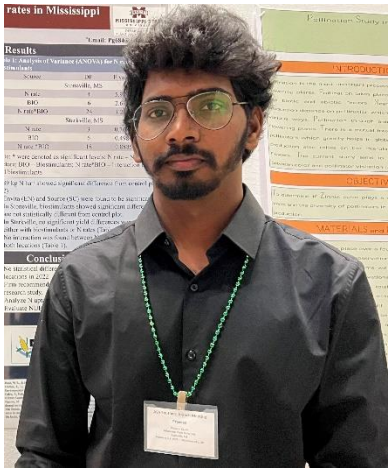
Presenter: Praveen Gajula

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Jagmandeep Dhillon, Plant and Soil Sciences

Title: Impact of biostimulants at variable nitrogen rates in Mississippi corn production systems



Abstract: Major challenges faced by corn producers are low nutrient use efficiency, volatile fertilizer cost, and dwindling production. Even though heavy incorporation of nitrogen (N) ameliorates yield but has no affirmative effect on nitrogen use efficiency (NUE). To strengthen the prospect of N uptake and alleviate the yield in corn, new biological advancements are vital. However, literature associated with biostimulants interaction in cereal crops, especially corn is scanty. Therefore, to assess the impact of biostimulants and their interaction at variable rates of N on NUE and yield were studied under rainfed and irrigated conditions in Mississippi (MS). Field trials were conducted at two experimental stations at Starkville and Stoneville, MS. A total of 36 plots including 12 controls were replicated four times within a split-plot design where N rate was the main plot factor. Six commercially extracted microbial biostimulants (Source®, Envita, iNvigorate®, Blue N, Micro AZTM, and Bio level phosN) at their recommended rates were foliar dispensed at V4-V5 stages as subplot factors. Four different N rates 0, 89, 179, and, 224 kg N ha-1 were included at Starkville, whereas an additional rate of 269 kg N ha-1 was incorporated at Stoneville. At Starkville, grain yield ranged from 9.3 to 10.3 Mg ha-1 and none of the biologicals tested resulted in any significant yield differences. At Stoneville, grain yield ranged from 7.5 to 13 Mg ha-1 with both N rate and biological treatments significantly affecting grain yield, however, no interaction was noted between the two factors. Specifically, yield increased with the application of 89 kg N ha-1 over the check plot, and no significant differences were noted between 89 kg N ha-1 and higher N rates. Significant differences were noted within biologicals. However, this was not statistically different from the check plot where no biological was applied. Overall, data from 2022 has shown limited potential with the use of biologicals on corn grain yield, however, we still need to evaluate its effect on NUE, and would like to continue this work for an additional year to make any firm and final recommendations to producers in MS.

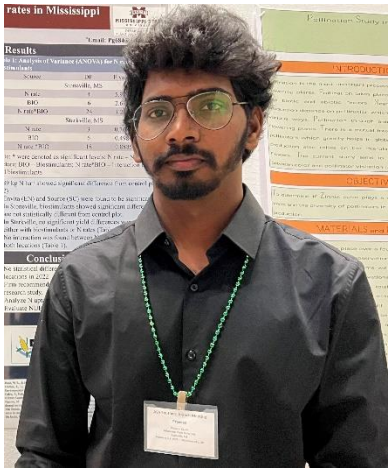
Presenter: Praveen Gajula

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Jagmandeep Dhillon, Plant and Soil Sciences

Title: Evaluating the impact of biostimulants at variable nitrogen rates in Mississippi corn production systems



Abstract: Major challenges faced by corn producers are low nutrient use efficiency, volatile fertilizer cost, and dwindling production. Even though heavy incorporation of nitrogen (N) ameliorates yield but has no affirmative effect on nitrogen use efficiency (NUE). To strengthen the prospect of N uptake and alleviate the yield in corn, new biological advancements are vital. However, literature associated with biostimulants interaction in cereal crops, especially corn is scanty. Therefore, to assess the impact of biostimulants and their interaction at variable rates of N on NUE and yield were studied under rainfed and irrigated conditions in Mississippi (MS). Field trials were conducted at two experimental stations at Starkville and Stoneville, MS. A total of 36 plots including 12 controls were replicated four times within a split-plot design where N rate was the main plot factor. Six commercially extracted microbial biostimulants (Source®, Envita, iNvigorate®, Blue N, Micro AZTM, and Bio level phosN) at their recommended rates were foliar dispensed at V4-V5 stages as subplot factors. Four different N rates 0, 89, 179, and, 224 kg N ha-1 were included at Starkville, whereas an additional rate of 269 kg N ha-1 was incorporated at Stoneville. At Starkville, grain yield ranged from 9.3 to 10.3 Mg ha-1 and none of the biologicals tested resulted in any significant yield differences. At Stoneville, grain yield ranged from 7.5 to 13 Mg ha-1 with both N rate and biological treatments significantly affecting grain yield, however, no interaction was noted between the two factors. Specifically, yield increased with the application of 89 kg N ha-1 over the check plot, and no significant differences were noted between 89 kg N ha-1 and higher N rates. Significant differences were noted within biologicals. However, this was not statistically different from the check plot where no biological was applied. Overall, data from 2022 has shown limited potential with the use of biologicals on corn grain yield, however, we still need to evaluate its effect on NUE, and would like to continue this work for an additional year to make any firm and final recommendations to producers in MS.

Presenter: Rabina Kumpakha

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Donna M. Gordon

Title: Efficacy of antifungal compound occidiofungin against mature biofilm by Candida species

Abstract: Candida biofilms associated with medical devices pose a serious health concern as these cells can enter the blood stream and cause systemic infections. Although Candida albicans is most common in biofilm-associated infections, other nonalbicans Candida species are increasingly reported from hospital settings. The structural complexity of a mature biofilm, including the heterogenous population of cells and surrounding extracellular matrix material, makes it resistant to antifungal treatment and complete elimination difficult. Prior data has demonstrated that occidiofungin effectively prevents attachment of cells and reduces biofilm formation in C. albicans and C. tropicalis. Here, we have extended our studies to investigate the impact of occidiofungin on mature biofilm using an in vitro biofilm model. The minimum biofilm inhibitory concentration of occidiofungin required to eliminate cells from a mature biofilm, was determined by measuring metabolic activity and viable cell number by XTT and colony forming unit assays, respectively. Structural changes in mature biofilm post antifungal exposure were identified by confocal microscopy. Our results indicate that occidiofungin can effectively eradicate cells within a mature biofilm of both C. albicans and C. tropicalis with a 2-fold lower dose of occidiofungin required for C. tropicalis biofilm compared to C. albicans. Short-term exposure of cells to a sublethal dose of occidiofungin was found to promote morphological changes including the accumulation of abnormal hyphae and reduction in hyphal cells. Together these results demonstrate that occidiofungin targets cells within a mature biofilm suggesting it may be an effective antifungal agent for the prevention and treatment of Candida biofilm-associated infections.

Presenter: Ramandeep Kumar Sharma

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Jagmandeep Dhillon, Assistant Professor, Plant and Soil Sciences

Title: Crop-climate interactions in corn, rice, and wheat: Southeastern USA

Abstract: Climate change and its impact on agriculture productivity vary among crops and regions. The southeastern United States (SE-US) is agro-ecologically diversified, economically dependent on agriculture, and mostly overlooked by agroclimatic researchers. The objective of this study was to compute the effect of climatic variables; daily maximum temperature (Tmax), daily minimum temperature (Tmin), and rainfall on the yield of major cereal crops i.e., corn (Zea mays L.), rice (Oryza sativa L.), and wheat (Triticum aestivum L.) in SE-US. A fixed-effect model (panel data approach) was used by applying the production function on panel data from 1980 to 2020 from 11 SE-US states. An asymmetrical warming pattern was observed, where nocturnal warming was 105.90%, 106.30%, and 32.14%, higher than the diurnal warming during corn, rice, and wheat growing seasons, respectively. Additionally, a shift in rainfall was noticed ranging from 19.2 to 37.2 mm over different growing seasons. Rainfall significantly reduced wheat yield, while, it had no effect on corn and rice yields. The Tmax and Tmin had no significant effect on wheat yield. A 1 °C rise in Tmax significantly decreased corn (− 34%) and rice (− 8.30%) yield which was offset by a 1 °C increase in Tmin increasing corn (47%) and rice (22.40%) yield. Conclusively, an overall temperature change of 1 °C in the SE-US significantly improved corn yield by 13%, rice yield by 14.10%, and had no effect on wheat yield.

Presenter: Ramandeep Kumar Sharma

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Jagmandeep Dhillon, Assistant Professor, Plant and Soil Sciences

Title: Crop-climate interactions in corn, rice, and wheat: Southeastern USA

Abstract: Climate change and its impact on agriculture productivity are crop-cum-region specific. The southeastern United States (SE-US) is agro-ecologically diversified, economically dependent on agriculture, and mostly overlooked by agroclimatic researchers. The objective of this study was to compute the effect of climatic variables; daily maximum temperature (Tmax), daily minimum temperature (Tmin), and rainfall on the yield of major cereal crops i.e., corn (Zea mays L.), rice (Oryza sativa L.), and wheat (Triticum aestivum L.) in SE-US. A fixed-effect model (panel data approach) was used by applying the production function on panel data from 1980 to 2020 from 11 SE-US states. An asymmetrical warming pattern was observed, where nocturnal warming was 105.90%, 106.30%, and 32.14%, higher than the diurnal warming during corn, rice, and wheat growing seasons, respectively. Additionally, a shift in rainfall was noticed ranging from 19.2 to 37.2 mm over different growing seasons. Rainfall significantly reduced wheat yield, while, it had no effect on corn and rice yields. The Tmax and Tmin had no significant effect on wheat yield. A 1 °C rise in Tmax significantly decreased corn (− 34%) and rice (− 8.30%) yield which was offset by a 1 °C increase in Tmin increasing corn (47%) and rice (22.40%) yield. Conclusively, the overall temperature change of 1 °C in the SE-US significantly improved corn yield by 13%, and rice yield by 14.10%, and had no effect on wheat yield.

Presenter: Ranadheer Reddy Vennam

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Raju Bheemanahalli

Title: Corn silk dynamics to soil moisture deficit and its impact on yield

Abstract: Soil moisture deficit during flowering can negatively affect kernel setting in corn. The synchronous development of male and female inflorescence is important for successful pollination and kernel set in corn. However, corn silk is highly sensitive to soil moisture deficit conditions. Silk (female) responses to soil moisture deficit are less explored due to its complex development process. Therefore, this study is focused on quantifying the impact of soil moisture during silk development, kernel set, and yield in corn hybrid A6659VT2RIB. Five levels of irrigation were provided with 1000 mL as optimum and 800 mL, 600 mL, 400 mL, and 200 mL (suboptimal) for 14 days during pollination. Length, number, and dry weight of silk were recorded for four consecutive days across treatments. Soil moisture deficit negatively affected the silk parameters. On average, silk number and silk dry weight were reduced by 45% and 34%. Water deficit during silking delayed silk emergence, which resulted in a substantial yield loss ($p<0.001$). A linear decline in kernel yield was observed with an increase in soil moisture deficit ($R2 = 0.92$). Average kernel number and kernel weight was reduced by 53% and 54%, with the harvest index ranging from 0.51 and 0.02. Plants under 200 mL irrigation had delayed silk growth and maximum yield loss. These results indicate that short-term drought can cause asynchronous male and female development and result in significant yield loss. Apart from the yield, a significant soil moisture deficit effect was observed in kernel starch ($p<0.001$) and protein ($p<0.001$) content. Our results suggest that improving the resilience of silk to drought might increase corn yields. The functional relationships between soil moisture and reproductive traits can be integrated into corn models for optimizing irrigation scheduling based on the available soil moisture content.

Presenter: Ranadheer Reddy Vennam

Level of Study: Master's

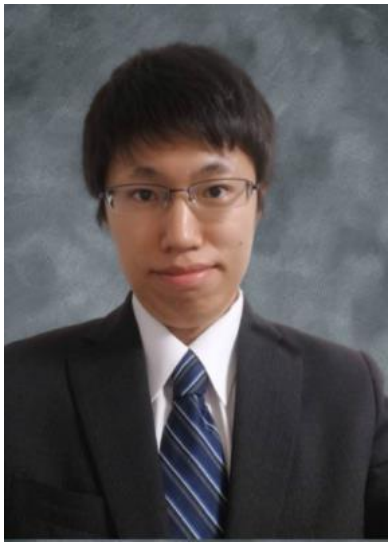
Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli, Assistant Research Professor, Department of Plant and Soil Sciences

Title: Assessment of drought stress impacts on flowering and grain filling stages of corn

Abstract: Drought is one of the major abiotic stresses that negatively affect corn-growing regions. The yield potential of corn is at risk due to drought stress during flowering and grain filling. The rate of yield reduction depends on the growth stage and magnitude of the drought. Therefore, this study aimed at systematically quantifying drought stress impacts on the physiology, yield, and quality of corn during flowering and grain filling stages. Four levels of suboptimal irrigation as drought treatments along with control (optimum irrigation) were provided during flowering (14 d, VT-R1) and grain filling (30 d, R2-R5) stages. Drought stress significantly affected stomatal conductance ($p<0.001$), transpiration ($p<0.001$), and chlorophyll content ($p<0.001$) during flowering and grain filling. Fourteen days of drought during flowering affected silk developmental processes and induced a significant reduction in kernel number (53%) and kernel weight (54%) compared to the optimum irrigation treatment. Sub-optimum irrigation during grain filling had less impact on kernel number (7%) than kernel weight (19%) compared to the control. Failure in kernel setting and kernel filling during flowering and grain filling had a pronounced impact on the final yield, respectively. Our findings suggested that drought adaptation strategies vary depending on growth stages. Future studies screening diverse corn genotypes/hybrids might help identify reproductive stage drought-tolerant hybrids for rainfed conditions. In addition, our findings might guide better irrigation management practices during peak flowering and grain-filling stages to sustain higher yields.

Presenter: Riku Kikuta



Level of Study: PhD

Category: Engineering

Advisor: Daniel Carruth, Associate Research Professor, Center for Advanced Vehicular Systems

Title: Risk Assessment and Modeling of Driver with pedestrian using Risk Potential Theory

Abstract: Recently, various self-driving and driving assistance systems such as Advanced Driver Assistance System (ADAS) have been developed with the intent to reduce the number of motor vehicle accidents. While self-driving systems have been proven to reduce traffic accidents , the systems sometimes make other drivers confused because of their mechanical behavior. To avoid confusion and possible error, it is necessary to construct self-driving systems that exhibit human-like behaviors. Risk Potential theory has been used to construct models that successfully represent driver behavior, especially expert behavior. This project uses Risk Potential theory to construct and evaluate a collision avoidance driver model which uses braking to avoid potential collisions with pedestrians. As a first step, a basic driver model which uses Risk Potential theory is constructed and evaluated using metrics such as collision avoidance, comfortability, and false alarm avoidance. Second, human driver data is collected and used to construct a human-like driver model. Finally, the human-like driver model is compared to previous models.

Presenter: Rita Druffner

Level of Study: PhD

Category: Education, Arts and Sciences, and Business

Advisor: MacKenzie Sidwell, Department of Counseling, Educational Psychology, and Foundation

Title: A Systematic Review of Function-Based Interventions for Students with Emotional Behavior Disorders: Preliminary Results

Abstract: A cornerstone of applied behavior analysis the assessment and treatment through function-based interventions. These principles can be applied to a wide-range of challenging behaviors. However, there appears to be limited research analyzing the use of functional assessments and function-based interventions for students with emotional disorders. Students with emotional behavior disorders are at a higher risk for poor academic outcomes, poor social outcomes, and contacting the school-to-prison pipeline. This presentation aims to discuss the preliminary findings of a review of empirically supported literature pertaining to function-based interventions for students with or at-risk for an emotional or behavior disorders across educational environments. This research seeks to identify current practices in the area of functional assessment and function-based interventions for this population to be used by researchers and clinicians to make improvements in these areas of weakness.

Presenter: Robert E. Calabrese

Level of Study: PhD

Category: Engineering

Advisor: Dr. Ryan Green, Assistant Professor of Electrical and Computer Engineering

Title: Effects of Droplet Size and Dispersion Homogeneity on the Dielectric Integrity of Liquid Metal Polymer Composites

Abstract: With high deformability, low reactivity, and low toxicity, liquid metal polymer composites (LMPCs) composed of polydimethylsiloxane (PDMS) and eutectic gallium-indium-tin alloy (GaInSn or galinstan) have shown to be an effective solution to improving the performance and durability of stretchable and deformable electronics, particularly in wearable and implantable electronic devices. The mechanical and electrical properties of LMPCs can be tailored for a variety of electronic and dielectric applications by altering the concentration of galinstan as well as by adding additional filler materials to the composite. However, previous works have concluded that higher concentrations of galinstan or other conductive materials are detrimental to the dielectric integrity of the composites. Increasing the concentration of conductive material dramatically lowers the dielectric strength and partial discharge inception electric field (PDIE) of such composites. Previous studies have also shown that small iron particles adversely affect the dielectric strength of the material, most likely due to the electric field enhancements from their small radius. Although geometry is known to have a great impact on electric field, research is lacking on the effect of galinstan droplet size on the dielectric failure properties of LMPCs. It is also unknown whether the way the liquid metal droplets are dispersed in the polymer would contribute to variations in electric field, partial discharge, or dielectric strength. In this study, two separate dispersions of galinstan with an average droplet diameter of 1 micron and 10 microns are mixed into PDMS at varying volume concentrations, poured into circular molds, and cured. The samples are then characterized experimentally with respect to dielectric strength and PDIE. Finite element analysis is conducted of two-dimensional models of LMPCs, and the effect of galinstan droplet size on the electric fields within the composite is studied. Since larger galinstan droplets tend to settle to one side of the samples during the curing process, the impact of composite homogeneity on electric field distribution is also modeled. The results obtained from this study are expected to enable the ability to optimize dielectric integrity of LMPCs of a given liquid metal concentration by tuning the average liquid metal droplet size.

Presenter: Roberto Kimura

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Bruno Kanieski da Silva, Ph.D., Department of Forestry

Title: Vertical integration and land cover change: a case study of the Brazilian pulp industry

Abstract: Understanding the drivers of land use is essential to assist decision-makers in agriculture and forestry. Over the last few years, the pulp and paper industries' expansion has substantially changed Brazil's landscape. The area of Eucalyptus plantations increased by around 41 %/year between 2002 and 2020 in Midwest Brazil. We used logit and zero-inflated panel models under different specifications to model the region's land cover change (LCC). Our results indicate that the probability of land conversion to timberland decreases as the distance from the site increases and that there is a positive time trend with LCC. On the other hand, the models did not find significant statistical results for LCC in sites classified as pasture in 2002. These results enlighten the exposure of the domestic land dynamics and assist agents in forecasting land conversion before installing new mills.

Presenter: Sabina Regmi

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Ayoung Kim, Assistant Professor, Department of Agricultural Economics

Title: Meta-analysis of Consumers' willingness to pay for broadband

Abstract: Broadband is high-speed internet with at least 25Mbps download speed and 3Mbps upload speed set by Federal Communication Commission (FCC) in 2015. As an essential component to modern daily life, a reliable broadband connection is needed for online education, remote work, telehealth, e-commerce, and using social media. Broadband access is linked to improving human capital, increasing firm efficiency and productivity, and strengthening community competitiveness through faster growth in employment, number of businesses, and higher property value .Also, it is associated with societal benefits in the form of economic opportunities, civic engagement, political participation, and public education .The impact of broadband has been well evaluated in the literature, but less is known about how much consumers value broadband. With the increased importance of broadband and its benefits, considerable studies have measured the socio-economic impact of broadband. Recently, researchers have analyzed consumers' willingness to pay (WTP) for broadband. Quite a few studies have evaluated WTP for broadband controlling for broadband use and its attributes (speed, reliability, or bundling), consumers' demographic and socio-economic characteristics, and their location. Each study and its findings are relevant to the specific conditions of that particular study, for instance, the valuation techniques, study areas, and broadband attributes. These study variations create heterogeneity in results and make it difficult to derive conclusive decisions. To the best of our knowledge, this is the first comprehensive study systematically reviewing the literature on WTP for broadband using a quantitative method. This study identifies attributes that lead to different levels of WTP for broadband through a comparison of studies. Meta-analysis is applied to account for WTP for broadband based on a thorough review of relevant literature and helps us answer the following research questions: 1) How do different characteristics within/between studies influence WTP estimates? 2) What characteristics of consumers significantly affect WTP for broadband? 3) What broadband attributes do users most often consider when expressing their WTP? This study can provide generalized facts through meta-analysis controlling for factors related to variation in WTP estimates and help policymakers, Extension specialists, and internet service providers increase their understanding of consumers' perception of broadband.

Presenter: Sadikshya Poudel

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli Rangappa, Assistant Research Professor, Department of Plant and Soil Sciences

Title: Elucidating the impacts of drought stress during pod development in soybeans

Abstract: Drought stress due to low rainfall during the peak blooming and pod filling has been the main constraint of soybean production in the Southern US. The ever changing-climate conditions are predicted to increase drought spells which hamper every growth cycle of a plant, with flowering and seed filling being the most sensitive. To elucidate the impact of drought stress, twelve soybean cultivars were exposed to low soil moisture content during pod development, and a range of gas exchange and yield components were measured to identify drought-resilient high-yielding cultivars for the Southern US climate. The photosynthetic rate decreased by 38% under drought stress compared to control. The plants grown under drought stress for 30 days showed reduced plant height (27%) with few node numbers (17%) compared to the control condition. Decrease in stomatal conductance (62%) and transpiration (37%) were observed for drought-stressed plants, which increased canopy temperature by +2 °C compared to the control. A significant variation was observed between treatment ($p < 0.001$) and cultivars ($p < 0.001$) for the yield parameters. Averaged across the cultivars, the seed number decreased from 372 to 195 plant-1 under control and drought stress, respectively. Consequently, seed yield decreased by 36% under drought stress in comparison to control. Our study identified some soybean cultivars that performed better under control and poorly under drought stress, emphasizing the complexities associated with drought stress tolerance. We also explored the functional limitation caused by drought stress during pod formation in soybeans. These findings also emphasize the need for an improved understanding of genetic regulation at different development stages to develop drought-resilient high-yielding soybean cultivars.

Presenter: Sadikshya Poudel

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli Rangappa, Assistant Research Professor, Department of Plant and Soil Sciences

Title: Characterization of Southern United States soybean cultivars for heat and drought stress tolerance

Abstract: Drought and heat stress episodes are the major abiotic stress factors causing significant losses in yield and quality. The impacts of individual stress (heat or drought) on soybean physiological and morphological traits have been examined, while information related to interactive stress is limited. In this study, twelve soybean cultivars were subjected to four different treatments (32°C daytime with soil moisture content, 100% irrigation, characterized as an optimum growing condition), heat (38°C daytime+100% irrigation, drought (50% irrigation+32°C daytime) and heat and drought (38oC+50% irrigation) during reproductive and pod filling stage. Two-factor stress had a significant impact on the gas exchange and growth parameters. Maximum reduction in the photosynthetic rate was observed under interactive stress (56%) followed by drought (38%) and heat (37%) compared with control. Combined heat and drought stress significantly impeded the photosynthetic rate by decreasing CO2 availability due to a maximum reduction in the stomatal conductance (74%) as compared to the control. The plants under drought stress displayed the highest decrease in transpiration (62%), resulting in maximum water use efficiency followed by combined stress and heat stress as compared to control. Furthermore, combined heat and drought stress resulted in a substantial decrease in the efficiency of photosystem II (28%) compared to control. The two-factor stress during flowering-early seed filling reduced the pod number by 46%, pod weight by 54%, seed number by 52%, and seed weight by 57%. It was evident from our study that the ability to tolerate combined stress varies among soybean cultivars studied. Our study quantified the impact of individual and combined heat and drought stress which helps in identifying traits and cultivars with a highly desirable phenotypic expression that could offer valuable resources for breeding multi stress-tolerant soybeans.

Presenter: Sakar Nepal

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Eric McConnell, Assistant Professor, Department of Forestry

Title: THE IMPORTANCE OF FOREST RESOURCE DEVELOPMENT PROGRAM TO FOREST INVESTMENT

Abstract: Millions of dollars are collected through Mississippi's timber severance tax every year which then funds Forest Resource development Program (FRDP). FRDP is a cost share incentive to support landowners in their forest management expenses. This study examined the effect of Mississippi's timber severance tax and FRDP on forest investment. The Multivariate Adaptive Regression Splines (MARS) algorithm and its variable importance features were used to analyze the changes in the Land Expectation Value (LEV) brought by different levels of FRDP incentives while considering different forest management, discount rates, and stumpage prices scenarios. The results of this study suggest that a landowner's decision to participate in the FRDP incentive program is the most important factor they have control over to increase the LEV. It was also found that the FRDP incentives increase the LEV in every scenario, but the relative importance of the incentives varies for different levels of the variables. Landowners who seek higher discount rates, who own lower quality lands and who receive lower value for their stumpage are the ones who can expect higher LEVs as a result of the incentives.

Presenter: Sakar Nepal

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Eric McConnell, Assistant Professor, Department of Forestry

Title: MISSISSIPPI'S TIMBER SEVERANCE TAX AND IT'S CONTRIBUTION TO THE ECONOMY

Abstract: Mississippi's timber severance tax, levied on per specified unit of harvest basis, was authorized by the legislature to discourage wasteful cutting of timber and support private forest landowners through the Forest Resource Development Program (FRDP). FRDP is a cost-share program through which landowners can recover up to 75% of their forest management expenses. Millions of dollars are collected as severance tax and flow into the economy through FRDP incentives every year. To uncover their regional economic implications in recent times, the contribution of the severance tax and FRDP to Mississippi's economy was analyzed in this study. The contribution analysis was conducted using a modified Leontief's input-output model that uses the coefficients from IMPLAN 2019 and Lightcast. The imbalances between the input and output totals were reconciled using the RAS method to obtain the final Leontief's inverse matrix. The total possible contribution was estimated to be $6.0 million in industrial output and 222 full-time and part-time employment. However, only about 70% of the FRDP funds were expended in that year, and the actual contribution was short by $1.80 million in output and 80 full-time and part-time employment. The results of the study highlighted the necessity for outreach to promote FRDP among landowners to increase their participation in the program and get the economic benefits from the program to the full potential.

Presenter: Sawyer Hopkins

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Whitney Crow Assistant Professor
Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology

Title: Efficacy of Insect Growth Regulators on Lepidopteran Pest of Soybean

Abstract: Co-application of an insect growth regulator insecticide and fungicide in soybean at the R3 to R4 growth stage is not uncommon in Mississippi. There are a few different insect growth regulators on the market which include diflubenzuron, novaluron, and methoxyfenozide. Diflubenzuron and novaluron inhibit chitin formation, while methoxyfenozide acts on the molting process of immature growth stages. The impact of these insect growth regulator applications on pest and beneficial insects and the economic benefits to soybean production have not been thoroughly investigated. The objective of this study is to show the impact of selected insect growth regulators on insect pest infestations and soybean yield.

Presenter: Shaylin Williams

Level of Study: PhD

Category: Engineering

Advisor: Dr. Jean Mohammadi-Aragh, Undergraduate Program Coordinator, Associate Professor, ECE Chief Diversity Officer, and Director of the BCoE Office of Diversity

Title: Summer Bridge and Beyond: Examining Freshmen and Continuing Students' Experiences

Abstract: If a group of engineering deans were asked whether students at their institutions were successful and why, what information might they immediately or subconsciously use to measure or gauge the engineering students' success? If only academic performance outcomes like GPA, individual course grades, or graduation rate race to their minds, then their rationale aligns with the majority of researchers. My research seeks to shift the mindset that frames engineering student success mainly within the boundaries of academic performance measures. Measuring students' self-determination and motivation levels by gauging perceived autonomy, competence, social integration and relatedness within their programs, and aspirations after graduation, one can more accurately judge whether engineering students are achieving holistic student success. By utilizing surveys and exit interviews for freshmen Summer Bridge Program (SBP) participants, interviewing continuing and past SBP participants, and surveying engineering seniors, this research will gather more in-depth information on students' experiences.

Preliminary results from SBP freshmen interviews indicate that key program components affecting students' success, motivations, and aspirations include community building, structured studying, field trips and real-world experience, residential life, and mentorship. Preliminary findings for continuing SBP students, whose classifications range from sophomore to senior, include emphases on being Black in engineering, program structure, program leadership and connections, and relatedness in SBP being non-transferable to undergraduate departments. The ongoing analyses of this qualitative data, coupled with the collection of quantitative data from engineering seniors, will offer valuable insight into ways to approach persistent issues in engineering education.

In turn, one can better understand how the structures of engineering summer and undergraduate programs either contribute to or detract from student success and motivation. This information can be used in practice for enhancing programmatic planning and design as well as potentially developing novel program components that contribute to students becoming more self-determined, motivated engineers. It is my hope that one day in the near future, engineering education faculty, administrators, and leaders will cultivate and measure success based on a more comprehensive assessment of lived experiences and better recognize how their decisions regarding programmatic structures impact students' success and motivation.

Presenter: Simegnew Yihunie Alaba

Level of Study: PhD

Category: Engineering

Advisor: Dr. John Ball, Electrical and Computer Engineering

Title: WabileNet: Wavelet-Based Lightweight Feature Extraction Network

Abstract: Designing a lightweight convolutional neural network with high accuracy is challenging due to the information loss, which mainly affects small objects when a deep network is designed due to the pooling operation at each layer of the network. This work presents a lightweight convolutional neural network using discrete wavelet transform (DWT) and inverse wavelet transform (IWT) as downsampling and upsampling operators, respectively, without pooling and stride operations. The downsampling layer is built using DWT and downsampling block, whereas the upsampling layer is designed using IWT and upsampling block. The lossless property of wavelets helps to restore the lost details during the downsampling operation.

Additionally, in the standard convolution, a single filter is applied, but low- and high-frequency filters are applied in this work, which helps capture more input portions and increases the receptive field size. Depth-wise separable convolution is also adopted to reduce the number of parameters of the model. The proposed model has 5.69 times and 30.8 times fewer parameters than ResNet-50 and VGG16 backbone network.

The experimental results on the CIFAR-10, CIFAR-100, and ImageNet datasets show that the proposed feature extraction network's accuracy is comparable to ResNet-50 and VGG16 networks with fewer parameters and are more suitable for small object classification.

Presenter: Suchana Aryal

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Eric McConnell, Assistant Professor, Department of Forestry

Title: STAND-LEVEL VARIABLE-DENSITY YIELD EQUATIONS FOR OAK-GUM-CYPRESS BOTTOMLAND HARDWWOD FORESTS

Abstract: The importance of bottomland hardwood (BLH) forests to support the economy through timber production is acknowledged; however, their full potential is yet to be explored. The need for the growth and yield modeling tool for the productive BLH sites was the basis for this study. Variable density yield equations were constructed using fuzzy linear regression techniques for BLH oak-gum-cypress forests along the US Gulf Coast and lower Mississippi River delta region. Fuzzy linear regression was employed when the dataset presented vagueness and was found appropriate and superior to the more utilitarian multiple linear regression. The data were obtained from the USDA Forest Service's Forest Inventory and Analysis (FIA) program. Independent variables included stand age, site index, growing stock basal area per acre, and thirteen ecoregion dummy variables. The dependent variables were the cubic foot growing stock volume (GSV) yield and the Doyle board foot sawlog volume (SLV) yield per acre. Sample plots (n = 526) located in Alabama, Arkansas, Louisiana, Mississippi, western Tennessee, and eastern Texas averaged 58 years of age with a basal area of 90 square feet per acre. The site index averaged 79 feet for sweetgum at a base age of 50 years. The GSV averaged 2,556 cubic feet per acre, and SLV averaged 11,183 board feet per acre. The adjusted R2 was 98% for GSV and 77% for SLV. The basal area possessed fuzzy characteristics in the GSV model, while the SLV model's intercept was fuzzy. Six ecoregions possessed fuzziness in each model, but these were not identical across models. The models were validated and are expected to operate realistically across a wide range of BLH sites, be relevant, simple to use, easily accessible, and are expected to be a valuable decision-making tool for any individual/group who is willing to manage their land for oak-gum-cypress forest mix.

Presenter: Suchana Aryal

Level of Study: Master's

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Eric McConnell, Assistant Professor, Department of Forestry

Title: ESTIMATING ABOVEGROUND CARBON STOCK AND SEQUESTRATION POTENTIAL OF OAK-GUM-CYPRESS FOREST IN BOTTOMLAND HARDWOOD SITES

Abstract: Bottomland hardwood (BLH) forests are well-known for their carbon sequestration potential, making carbon markets a promising economic opportunity for BLH landowners, managers, and investors. However, there are limited empirical estimates of carbon sequestration specific to the BLH sites, which underscores the need for further research. As such, this study developed an aboveground live tree carbon stock model and explored the sequestration potential of BLH oak-gum-cypress forest type using USDA Forest Service Forest Inventory and Analysis (FIA) data for six BLH sites: Mississippi, Alabama, Arkansas, Louisiana, western Tennessee, and eastern Texas. The prediction was based on site index, basal area, and stand age. The carbon stock model was developed using multiple linear regression, and growth was based on the basal area increment. Adjusted R2 for the carbon stock model was 94.41%. The model's accuracy was evaluated using Mean Absolute Deviation (MAD: 3.53 tons/acre) and Mean Absolute Percent Error (MAPE: 14.22%), and the results revealed high model precision. Findings indicate that one acre of naturally regenerating oak-gum-cypress forests in BLH sites stored an average of 30.56 tons of carbon stock at an average stand age of 57 years, supporting the idea that BLH forests are an essential carbon sink. With a maximum average discounted present value of carbon accumulation of $15.94/ton/acre/year, findings suggest an additional revenue stream from carbon sequestration on the BLH sites.

Presenter: Sujita Balami

Level of Study: PhD

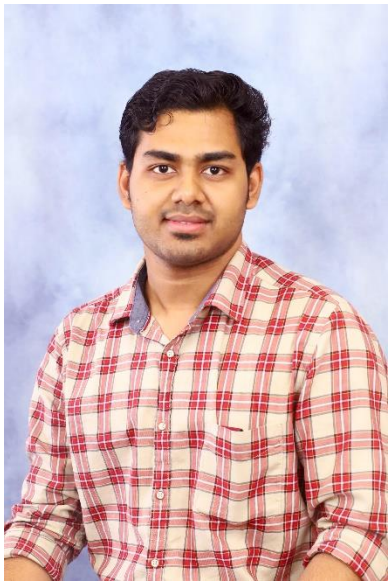
Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Matt Griffin, Research Professor, Veterinary Medicine, Delta R & E Center, Thad Cochran National Warmwater Aquaculture Center

Title: Streptococcus dysgalactiae subsp. dysgalactiae From Farm-raised Channel Catfish In Mississippi, USA

Abstract: Lancefield Serological Group C Streptococcus dysgalactiae subspecies dysgalactiae (GCSD) is considered an emerging pathogen in variety of fish species and has gained special interest lately from aquatic animal health experts in the United States. In the early 2000s, GCSD were reported from fish kills in amberjack (Seriola dumerili) and yellowtail (Seriola quinqueradiata) cultured in Japan. Later reports included additional isolates from diseased fish in Taiwan, China, Malaysia and India. Until recently, GCSD has been a pathogen of minimal concern in United States aquaculture. The group consists of two subspecies i.e. S. dysgalactiae subspecies equisimilis and S. dysgalactiae subspecies dysgalactiae. In 2020, GCSD were isolated from a disease outbreak in Nile tilapia at a research facility in Auburn, AL. Similarly, in 2021, GCSD was isolated from a fish kill involving feral populations of silver carp in the Mississippi river. In both instances, molecular sequence data revealed these isolates were homologous to GCSD associated with fish kills in Japan. In June 2022, a 10-pound channel catfish (Ictalurus punctatus) was received at the Aquatic Research and Diagnostic Laboratory of the Thad Cochran National Warmwater Aquaculture Center in Stoneville, Mississippi. Pure cultures of small, white, non-hemolytic colonies of gram-positive cocci were cultured on Mueller Hinton agar with 5% sheep's blood. The organism was initially identified as Streptococcus dysgalactiae by 16S rRNA sequence, warranting further investigation. A previously published multilocus sequence analysis (MLSA) scheme targeting 9 Streptococcus spp. housekeeping genes placed the catfish isolate with isolates from disease outbreaks in Japan, as well as the GCSD isolates from tilapia and silver carp in the US. These fish isolates formed their own discrete lineage, separate from other GCSD from humans and other terrestrial animals, indicating this phyletic group has an affinity to fish and the aquatic environment. Complete genomes of tilapia, silver carp and catfish isolates, as well as additional GCSD isolates from the Louisiana Aquatic Diagnostic Laboratory at Louisiana State University, were obtained using combinations of short-read (Illumina) and long-read (Oxford Nanopore) assemblies. While GCSD were previously thought to be limited to marine fish, isolation of these bacteria from freshwater systems indicates GCSD is a potential threat to US freshwater aquaculture, including farm-raised catfish. Herein, the first incidence of the GCSD in MS catfish aquaculture is detailed, and relationships to other GCSD in aquatic and terrestrial animals is discussed. Further investigations are required to assess the risk this potential emerging pathogen poses to catfish aquaculture in Mississippi.

Presenter: Swayamjit Saha



Level of Study: PhD

Category: Engineering

Advisor: Dr. Zhiqian Chen, Department of Computer Science and Engineering

Title: Comprehensive Wind Speed Prediction-Based Analysis of Stacked Stateful & Stateless Neural Network Models

Abstract: Wind is a powerful source of renewable energy, which can be used as an alternative to the non-renewable resources for production of electricity. Renewable resources are clean, infinite and do not impact the environment negatively during production of electrical energy. However, while eliciting electrical energy from renewable resources viz. solar irradiance, wind speed, hydro should require special planning and assistance failing which may result in huge loss of labour and money for setting up the system. We discuss four deep learning models viz. Stacked Stateful GRU, Stacked Stateful LSTM, Stacked Stateless LSTM and Stacked Stateless GRU which will be used to predict wind speed on a short-term basis for the airport sites beside two campuses of Mississippi State University. The paper does a comprehensive analysis of the performance of the models used describing their architectures and how efficiently they elicit the results with the help of RMSE values. A detailed description of the time and space complexities of the above models has also been discussed.

Presenter: Timothy Sellers

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Dr. Chaomin Luo

Title: Deep Learning-based Heterogeneous System for Autonomous Navigation

Abstract: In order to face the everyday growing population in today's world, the deployment of autonomous vehicles is a promising direction for precision agriculture. Autonomous vehicles (AVs) have been developed and deployed for various agricultural needs such as field planting, harvesting, soil collection, and crop data collection. One method of achieving those task is complete coverage path planning (CCPP), which constructs a continuous path that covers a wide area of interest. However, in a large farm with multiple fields, those tasks have been extremely complicated and computationally expensive on navigation system when utilizing a single AV. A heterogeneous system is proposed to sense the fields and solve the navigation and routing problem within multi-field path planning. We developed a deep learning-based routing scheme for UAV's to sense mature crops for harvest. The deep learning routing scheme utilizes a goal embedding feature and coordinate position feature to generate an optimal path for the UAVs, which allows them to find several candidate solutions. A deep learning-based complete coverage path planning (DLCCPP) navigation scheme is also proposed for our UGV's to navigate through the fields and collect the mature crops within them. The DLCCPP uses UAV's images in its deep learning network to construct the CCPP path from the AV coordinates.

Presenter: Timothy Sellers

Level of Study: PhD

Category: Engineering

Advisor: Dr. Chaomin Luo

Title: Graph-Based Path Planning for Autonomous Vehicles with Obstacle Fusion

Abstract: Autonomous vehicle (AV) navigation and mapping have been demanded in various fields such as agriculture, manufacturing, commercial and retail business. A variety of solutions to this issue have been discovered by utilizing graph-based methods to generate AV trajectory in dense workspaces. However, most of these methods need to account for two prevalent instances in which the AV's position is outside the graph and the connection between sub-graphs within the workspace. The proposed methodology aims to resolve these issues by presenting a dynamically updating Delaunay Triangulation with obstacle fusion for graph-based AV navigation and mapping in complex environments. Firstly, an obstacle fusion methodology is presented to cluster small and nearby obstacles within a given range to reduce its time complexity. Secondly, LiDAR data is gathered from the surrounding environment to construct the dynamically constrained DT (DCDT), which focuses on the local area and movements of surrounding obstacles, thus allowing the model to reduce its computational costs by only considering the area within the LiDAR range. Thirdly, an Improved Ant Colony Optimization (IACO) algorithm is applied to generate a near-optimal path utilizing the DCDT graph. The IACO algorithm utilizes a greedy search-based algorithm scheme to enhance the search and distribution strategy of the ants to find several different candidate solutions. Lastly, the model is validated through simulation and comparison studies to showcase the effectiveness and robustness of the proposed navigation method.

Presenter: Urita Agana

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Dr. Priyadarshini Chakrabarti Basu

Title: Multi Stressor Impacts on Honey Bee Physiology and Gut Microbiome

Abstract: Honeybees (Apis mellifera L.) are the major insect pollinators of many different crops. A drastic decline in the honey bee populations has been reported over the past decade. While many factors have contributed to this decline, pesticides, poor nutrition, and Varroa mites are the most common concerns noted by scientists and beekeepers. Aside from direct toxicity from pesticides, it has been observed that sublethal pesticide doses have effects on honey bee physiology and behavior such as oxidative stress, disruption of foraging and homing, olfactory inhibition and changes to honey bee neurophysiology. In addition, poor nutrition makes honey bees more susceptible to pesticide stress, parasites and pathogens and disrupts their ability to overwinter. The primary objective of this study is to examine the impacts of field realistic pesticide exposures and poor nutrition on honey bee gut microbiome diversity and individual bee physiology. In this study, 16 honey bee colonies were placed in each of the four different locations (Stoneville, Greenwood, Macon, and West Point) across Mississippi along an agricultural intensification gradient and with varying degrees of natural forage availability. Pollen and honey samples have been collected from these field sites to analyze for pesticides residues. In addition, live honey bees have been sampled for physiological assays and gut microbiome analysis. The experiment is currently ongoing, and the information gleaned from the results will reveal valuable insight about the interactions between these two stressors and their impacts on honey bees under field conditions.

Presenter: Vivek Venishetty

Level of Study: PhD

Category: Agriculture and Life Sciences

Advisor: Prof. Dr. Prem B. Parajuli, Department of Agricultural and Biological Engineering

Title: Assessment of BMPs by estimating Hydrologic and Water Quality outputs using SWAT in Yazoo River Watershed

Abstract: Water quality is a global concern; it is due to point and non-point source pollution. Non-point sources for pollution are mainly runoff from Agricultural and forest. To decrease nutrient inputs, management practices are implemented. Using Soil and Water Assessment Tool, water quality parameters can be quantified. Yazoo River Watershed is the largest watershed in Mississippi, which have impact on surface water quality due to large scale agriculture and forest lands. Model has been calibrated and validated for streamflow, sediment, Total Nitrogen (TN), Total Phosphorus (TP) for the USGS gauge stations in the watershed. Model efficiency was assessed with Coefficient of Determination (R2) and Nash-Sutcliffe Efficiency index (NSE). Best Management Practices (BMPs)

were implemented throughout the watershed to simulate the impact of BMPs on streamflow, sediment, and nutrient yields. Vegetative Filter Strips (VFS), Riparian Buffer, combination of VFS and Riparian buffer and Cover Crops (CC) were tested for assessing the effective BMP in improving water quality. VFS, Riparian buffer and both (VFS + riparian) have no effect on streamflow, but they were able to decrease sediment, TN, and TP yields. Scenario with both VFS and Riparian buffer had the highest reduction capability as per varying width (5, 10, 15, and 20 m). For CC, Rye grass, Winter Barley and Winter Wheat (WW) were used, of which Rye grass had highest, 5.3% reduction in streamflow. WW has the highest Total Nitrogen reduction that is of 25.4%. CC also has significant reduction ranged between 10% to 11% for TP. This research would assist the Agricultural community to apply appropriate Management practices to improve water quality

Presenter: Walaa Alqwider

Level of Study: PhD

Category: Engineering

Advisor: Vuk Marojevic

Title: SOFTWARE RADIO TESTBED FOR 5G AND L-BAND RADIOMETER COEXISTENCE RESEARCH

Abstract: Passive remote sensing through microwave radiometry has been utilized in Earth observation by estimating several geo-physical parameters. Because of the low noise floor associated with the instrument (i.e., radiometer), the received geophysical emission is sampled in a protected band dedicated to remote sensing. This protected L-band occupying 1400-1427 MHz is also exciting and ideal for science because of lower attenuation from the atmosphere. This reason has also made this microwave region ideal for next-generation (xG) wireless communication. 5G cellular systems support two frequency ranges FR1 (0.45 GHz–6 GHz) and FR2 (24.45 GHz-52.6 GHz). Although operating bands are prohibited to conduct any up-link or down-link operations in L-band, out-of-band (OOB) emissions can still have a significant impact on passive sensors because of the high sensitivity requirements related to science. This study will demonstrate a unique physical testbed that has the capability to observe in-band and OOB emissions in a protected anechoic chamber. Flexibility on transmitted waveforms and the potential to analyze raw measurements (IQ samples) of radiometers will help in designing on-board radio frequency interference (RFI) processing along with the coexistence of communication and passive sensing technologies.

Presenter: Will McKelvey

Level of Study: Master's

Category: Engineering

Advisor: Dr. Heejin Cho, Mechanical Engineering

Title: Characterization of Transport Losses in an Aerosol Sampling Train

Abstract: According to the DOE Nuclear Air Cleaning Handbook, High efficiency particulate air (HEPA) filters require a minimum efficiency of 99.97% for particles 0.3 micrometers in diameter and must meet a minimum rated pressure drop. In nuclear power plants, HEPA filters are the final barrier between the reactor and the environment. Filters must be characterized correctly to prevent the release of airborne radioactive particles. Estimating massloaded on the filter helps correctly predict the resistance to flow across the filter. To ensure the filters are working correctly, they are tested in the lab using a challenge aerosol and their efficiency and pressure drop is measured. Transport losses in the sampling train can lead to an underestimation of the challenge aerosol present within the test stand. An underestimation of the massloaded on the filter may lead to failure and the release of radioactive particles into the environment. The purpose of this work is to analyze the effects on the estimated particle concentration due to the transport losses resulting from the test setup and to correct the experimental results. Theoretical work suggests there are significant losses even for optimized setups. Experimentally, the concentration and size distribution of the test aerosol were measured for different instrument configurations to determine the impact on the data. From this, a correction factor may be determined to adjust the gathered experimental data. Experimental work hasshown that versus a control, there is a significant decrease in measured concentration over the whole distribution. There is also a gap between theoretical losses and actual losses. Experimental losses have been calculated to be much larger than theoretical losses can account for. Further analysisis needed to describe this difference.

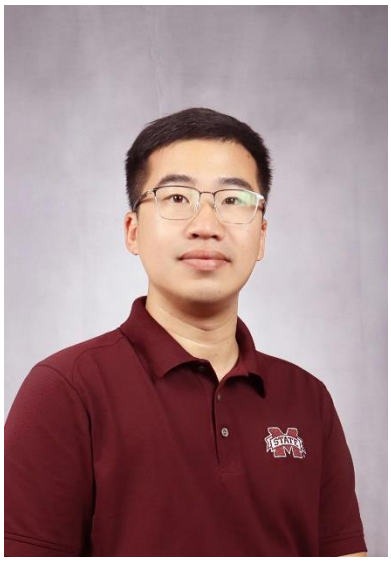
Presenter: Yukai Ai

Level of Study: PhD

Category: Engineering

Advisor: Chuji Wang, Professor, Physics department

Title: Optical-trapping, single-particle reactor for the study of heterogeneous chemistry



Abstract: Optical trapping (OT) and manipulation of single nano- and micron-sized particles has become a powerful tool used in diverse research fields, such as physics, chemistry, biology, materials, atmospheric sciences, etc. Combined with different spectroscopic techniques, such as Raman spectroscopy, cavity ringdown spectroscopy, elastic light scattering, etc, a wide variety of single particles, including carbons, dust, metal oxides, bioaerosols, organic/inorganic droplets, etc. have been studied in single particle level. In this study, we create a single-particle reactor (SPR) using optical trapping to mimic single, particulate mercury particles freely suspended in the atmosphere. In particular, we mixed HgX2 (X=Cl or Br) with single-wall carbon nanotubes particles and trapped a single mercury compound contained particle (a SPR) in an airtight chamber under controlled conditions (different chemical reagents, relative humidity, UV/vis-irradiation, etc.). The Raman spectra revealed details of heterogeneity of the HgX2 on the surface of the particle. The heterogeneous reaction between mercury compounds with ozone in the single-particle level was observed based on the time-evolution Raman spectra.

Presenter: Zonia Elizabeth Caro Carvajal

Level of Study: Master's

Category: Agriculture and Life Sciences

Advisor: Shecoya White - Food Science, Nutrition and Health Promotion

Title: Microgreen production: Impact of sanitization methods on germination percentage and mold suppression on Allium porrum L. seeds

Abstract: Seed sanitization is critical for microgreens production because it helps to prevent the growth of harmful microorganisms and diseases that can negatively impact the quality of the microgreens and consumer health. Improperly sanitized seeds can harbor foodborne pathogens (bacteria, fungi, and viruses), which can cause seedling diseases, reduce seedling vigor, and ultimately impact the final product. Proper sanitization often includes a combination of techniques to mitigate risk.

The purpose of this experiment was to determine the impact of sanitization methods on the germination percentage and mold inhibition on leek (Allium porrum L.) seeds used for microgreen production. Leek seeds (100 seeds) were exposed to different methods of sanitization, including: Hydrogen Peroxide (HP) at 9% for 10 minutes, Hot Water (HW) at 100% 85 ± 2°C for 10 seconds, Tsunami (TS) at 0.04% for 5 minutes, Vinegar (VN) at 2% for 15 minutes, and Deionized Water (DI) at 100% seeds soaked for 10 min. After treatment exposure, seeds were strained and rinsed with 100 ml of DI water and placed into sterile 100 mm × 20 mm petri polystyrene dishes containing a felt mat soaked with 2 ml of DI. For germination, treated seeds were incubated at 24 ± 2°C with 70-80% relative humidity and no light exposure. The germination percentage and mold detection were recorded daily for 5 days.

The germination percentages were 77.5% (HP), 74.5% (HW), 68.0% (TS), 60.3% (VN), and 63.0% (DI) by day 5 of incubation. Both HP and HW had a higher germination percentage than the other treatments at day 5. The HW treatment was the only treatment to inhibit the growth of mold throughout the 5-day incubation period. After two days of germination, mold growth was detected on all of the other treatments.

Seed sanitization is critical to successful microgreens production, as it helps to ensure the health and quality of the crops, reduce the risk of disease and cross-contamination, and ensure that microgreens are safe for consumption.

The GSA and Graduate School congratulate all Spring 2023 participants on their contributions to research!

MISSISSIPPI STATE UNIVERSITY

GRADUATE STUDENT ASSOCIATION

MISSISSIPPI STATE UNIVERSITY

THE GRADUATE SCHOOL