SPECIAL AREA COMPETITIONS

The Spring 2024 Undergraduate Research Symposium featured eleven Special Area Competitions, designed to provide discipline and category-specific recognition of excellence in student scholarship, sponsored by a variety of undergraduate research partners across Mississippi State University.
The 3Minute Research Pitch is a competition modeled after the Three Minute Thesis (3MT) graduate competition that challenges undergraduate students to present a compelling verbal presentation of their research topic and its significance in just three minutes and with a single slide.

**3MINUTE RESEARCH PITCH**

**Sponsored by The Graduate School**

Elena Palomino (76); Mentor, Myles Landers, Marketing, Quantitative Analysis, and Business Law

Hail State and Tip Your Server: The Interplay Between Tip Framing Techniques and Social Identity to Influence Restaurant Tip Choices

Catherine Kalmbach (219); Mentor, Brian Rude, Animal and Dairy Sciences

Solubility and Degradation of Human Fertility-Promoting Molecules in a Rumen Environment

Emma Palmer (249); Mentor, Natraj Krishnan, Biochemistry, Molecular Biology, Entomology, and Plant Pathology

Increased Levels of MMPs Impair Motor Function in a Fly Model of Spinocerebellar Ataxia Type 1

**PEOPLE’S CHOICE**

Madelyn Hunter (213); Mentor, Natraj Krishnan, Biochemistry, Molecular Biology, Entomology, & Plant Pathology

Circadian Locomotory Activity Patterns Exhibit Sexual Dimorphism in a Drosophila Model of Spinocerebellar Ataxia Type 1

Austen Breland (2); Mentor, Steven Elder, Agricultural and Biological Engineering

In Silico Insights into the Inhibition of ADAMTS-5 by Punicalagin and Ellagic Acid for the Treatment of Osteoarthritis

Tanner Jones (23); Mentor, Lauren Priddy, Agricultural and Biological Engineering

Replication of Impact Parameters from Cadaveric Lumbar Interbody Fusion Using a Benchtop Device

**BIOMEDICAL RESEARCH**

Sponsored by the Departments of Agricultural & Biological Engineering and Comparative Biomedical Sciences

This competition is for students in the life sciences and/or engineering who have conducted research related to preventing, diagnosing, or treating a human medical condition (i.e., illness, injury, or disease).

Madelyn Hunter (213); Mentor, Natraj Krishnan, Biochemistry, Molecular Biology, Entomology, & Plant Pathology

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# CALS & MAFES UNDERGRADUATE RESEARCH SCHOLARS PROGRAM

Sponsored by the College of Agriculture & Life Sciences and the MS Agriculture & Forestry Experiment Station

The Mississippi Agricultural and Forestry Experiment Station, along with the College of Agriculture and Life Sciences, hosts an awards program for all students in the 2023-2024 CALS/MAFES Undergraduate Research Scholars Program.

| 1ST | Jadyn Bowen (109); Mentor, Amanda Conrad, Food Science, Nutrition, and Health Promotion  
C.O.N.N.E.C.T: Communities Overcoming Need through Nutrition Education, Collaboration and Training |
| 2ND | Jordan Wilburn (267); Mentor, Richard Baird, Biochemistry, Molecular Biology, Entomology, & Plant Pathology  
Untargeted Metabolomic Analysis of the Impact of Selenium Supplementation and SELENOH Formation on Polar Liver Metabolites |
| 3RD | Trevor Haney (207); Mentor, Brandi Karisch, Animal and Dairy Sciences  
Gastrointestinal Parasite Reinfection in Dewormed Beef Steers Over a 90-d Grazing Period  
Tyler Barlow (169); Mentor, Brandi Karisch, Animal and Dairy Sciences  
Effect of arrival fecal egg count on growth and performance on stocker steers during a 90-d grazing period |
| HONORABLE MENTIONS | Jillian Robinette (257); Mentor, Te-Ming Tseng, Plant and Soil Sciences  
Improved Herbicide Selectivity in Tomato by Safening Action of Benoxacor, Fenclorim, Melatonin, and 2,4,6-Trichlorophenoxyacetic Acid  
Kristen Johnson (216); Mentor, Jean Feugang, Animal and Dairy Sciences  
Discriminating Highly Resilient Spermatozoa During Long-term Chilled Storage  
Seth Givens (197); Mentor, Mary Love Tagert, Agricultural and Biological Engineering  
Effect of Cropping System and Soil Moisture on Iron Deficiency Chlorosis (IDC) in Soybean: 2023 Results |

# ENGINEERING RESEARCH

Sponsored by the Bagley College of Engineering

Projects completed under the supervision of a faculty member in the Bagley College of Engineering are eligible to receive a Bagley College of Engineering Undergraduate Research Award.

**INTERDISCIPLINARY RESEARCH WINNER**

| Khaoula Kamal (24); Mentor, Lauren Priddy, Agricultural and Biological Engineering  
Mitigating Degradation of Additively Manufactured Porous Magnesium Scaffolds Using Hydroxyapatite Coating |

**VISUAL PRESENTATION WINNERS**

| Daniel Hogan (19); Mentor, David Van Den Heever, Agricultural and Biological Engineering  
Redesign Omnipod Insulin Delivery |

| Kyler Smith (31); Mentor, Cindy Bethel, Computer Science and Engineering  
Evaluating the Ability of a Robot to Communicate Emotion through Generated Audio |
DATA SCIENCE RESEARCH  
Sponsored by the Data Science Program
The MSU Data Science Program competition recognizes excellence in undergraduate research relevant to data science from any academic discipline.

### OVERALL WINNER: DATA SCIENCE AREA AWARD

<table>
<thead>
<tr>
<th>Name</th>
<th>Mentor</th>
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</thead>
<tbody>
<tr>
<td>Zijie Chen (5)</td>
<td>Sungkwang Mun, Center for Advanced Vehicular Systems</td>
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Autoencoder-Based Denoising and Temperature Conversion for Infrared Camera Images in Additive Manufacturing

### OUTSTANDING BASIC DATA SCIENCE RESEARCH PROJECT WINNER

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<tr>
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<tbody>
<tr>
<td>Nick Gray (17)</td>
<td>Sathishkumar Samiappan, Geosystems Research Institute</td>
</tr>
</tbody>
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Analyzing Energy Usage and Carbon Emissions from Training A Deep Neural Network On High-Resolution Imagery

### OUTSTANDING USE-INSPIRED DATA SCIENCE RESEARCH PROJECT WINNER

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Autoencoder-Based Denoising and Temperature Conversion for Infrared Camera Images in Additive Manufacturing

### HONORABLE MENTIONS

- Marlee Turner (161); Mentor, Jessica Benson, School of Human Sciences
  - The AI AgriRevolution: The use of AI in Mississippi’s Agricultural Service

- Kennedy Keyes (26); Mentor, Daniel Carruth, Center for Advanced Vehicular Systems
  - Evaluating Computer Vision Algorithms in Snow-Filled Environments with MAVS

### OUTSTANDING APPLIED DATA SCIENCE RESEARCH PROJECT WINNER

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</thead>
<tbody>
<tr>
<td>Shisir Baral (167); Mentor, Vitor Martins, Agricultural &amp; Biological Engineering</td>
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</tr>
</tbody>
</table>

Semantic Segmentation of Satellite Imagery for Land Cover Classification Using an Unet model

- Caleb Bowman (37); Mentor, Boniface Fosu, Geosciences
  - Quantifying the Climate Impact of Land Use and Cover Changes in the Southern US: Insights from CMIP-LUMIP

- Gregory Crotty (117); Mentor, Jarrod Moss, Psychology
  - An Analysis of the Effect of Cognitive Reflection on Insight Problem-Solving Behavior

- Shelby Carpenter (181); Mentor, Peixin Fan, Animal and Dairy Sciences
  - The Colostrum Microbiota of Dairy Cattle and its Potential Influence on Calf Gut Microbiota Development

- Erin Jones (135); Mentor, Jarrod Moss, Psychology
  - Machine Learning to Detect and Predict Cognitive Restructuring

### HONORABLE MENTION FOR PROJECTS THAT CONTRIBUTE TO DATA QUALITY AND AVAILABILITY

- Madeline Fredrick (11); Mentor, Christopher Hudson, Center for Advanced Vehicular Systems
  - Testing the Accuracy of LIDAR-based Mapping and Localization on an Unmanned Ground Vehicle

- Renae Leighton (230); Mentor, Garrett Street, FWRC -Wildlife Fisheries & Aquaculture
  - The Trouble with Time: Beware of Time Drift in On-Board Data Loggers in Wildlife Research

- Catelyn Dill (188); Mentor, Priyadarshini Basu, Biochemistry, Molecular Biology, Entomology, & Plant Pathology
  - Creating a Pollen Nutritional Database for North America

- Emma Blake U’Ren (264); Mentor, Priyadarshini Basu, Biochemistry, Molecular Biology, Entomology, & Plant Path.
  - Pollen Identification Database in the Southeast Region for Pollinator Research
FORESTRY & WILDLIFE RESEARCH

Sponsored by the College of Forest Resources and the Forest & Wildlife Research Center

Undergraduate research projects completed under the supervision of or in association with a faculty member in the College of Forest Resources are eligible to be recognized with a College of Forest Resources/Forest and Wildlife Research Center Undergraduate Research Award.

Curtis Coleman (183); Mentor, Garrett Street, FWRC -Wildlife Fisheries & Aquaculture
Characterization of Body Acceleration Data Signals for Remote Sensing of Complex Animal Behaviors

Renae Leighton (230); Mentor, Garrett Street, FWRC -Wildlife Fisheries & Aquaculture
The Trouble with Time: Beware of Time Drift in On-Board Data Loggers in Wildlife Research

Olivia Burdine (178); Mentor, Christine Fortuin, FWRC-Forestry
Investigating Plant-Pollinator Network Associations in Northeast Mississippi and Alabama

GULF COAST RESEARCH

Sponsored by The Gulf Scholars Program

The Gulf Coast Research award highlights projects that address issues facing the Gulf Coast, such as (but not limited to) community health and resilience, environmental protection and stewardship, and energy safety and sustainability.

Shawn Mackey (85); Mentor, Leah Kemp, Architecture
Preserving the Past, Securing the Future: Safeguarding Historic Structures in Tornado-Prone Communities

Tony Owens (141) Mentor; Shrinidhi Ambinakudige, Geosciences
An Investigation into Social Vulnerability and Flood Risks in the Yazoo-Mississippi Delta

HUMANITIES RESEARCH

Sponsored by The Institute for the Humanities

The humanities competition recognizes outstanding student work that highlights the insights and values of humanities scholarship.

Michael Herndon (60); Mentor, Silvina Lopez Barrera, Architecture
Community Resilience: Disaster Relief Practices and Informing Better Built Environments
### MSU LIBRARIES RESEARCH
**Sponsored by the Mitchell Memorial Library**
The MSU Libraries Research Award is designed to recognize undergraduate student research that incorporated the use of library resources and/or services.

**WINNER**
**Will White (57); Mentor, Eric Vivier, English**
Tamburlaine’s Victims: The Other Side of Religious Violence

### MOVEMENT SCIENCES & HEALTH RESEARCH
**Sponsored by the Department of Kinesiology**
Movement Sciences and Health is multidisciplinary studies on human movement that discusses and applies the dimensions of wellness related to personal and public health.

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
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<th>Title</th>
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<tbody>
<tr>
<td>1ST</td>
<td>Faith Hagan (84)</td>
<td>Kinesiology</td>
<td>Comparing Lead Leg Joint Kinematics During Obstacle Negotiation in Real and Virtual Reality Environments</td>
</tr>
<tr>
<td>2ND</td>
<td>Hasini Yamagowni (93)</td>
<td>Kinesiology</td>
<td>Pressure Pain Threshold Before and After a Physiological Workload</td>
</tr>
<tr>
<td>3RD/TIE</td>
<td>Raegan Adams &amp; Hartleigh Schambeau (79)</td>
<td>Kinesiology</td>
<td>The Effects of Adapted Physical Activity Program on Balance and Quality of Life for Young Adults With Intellectual Disabilities</td>
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<td>Agatha Taquino (90)</td>
<td>Kinesiology</td>
<td>The Virtual Moving Room Paradigm: Reloaded</td>
</tr>
<tr>
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<td>Hasini Yamagowni (93) Starkville High School; Mentor, Harish Chander, Kinesiology</td>
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<td>Pressure Pain Threshold Before and After a Physiological Workload</td>
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<td>Raegan Adams &amp; Hartleigh Schambeau (79); Mentor, Chih-Chia Chen, Kinesiology</td>
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### PUBLIC HEALTH RESEARCH
**Sponsored by the Department of Food Science, Nutrition, & Health Promotion**
Public Health Research Competition is designed to highlight the important work that undergraduate students at MSU are doing in public health research related to promoting and protecting the health of people and communities.

<table>
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<tr>
<td>1ST</td>
<td>April Guo-Yue (205)</td>
<td>Biochemistry &amp; Molecular Biology, U of Chicago Pritzker School of Molecular Engineering</td>
<td>Exploring a Novel Immune Modulation Approach for Monomeric Interferon Gamma (IFNγ) Design</td>
</tr>
<tr>
<td>2ND</td>
<td>Rachel Adair (98)</td>
<td>Communication</td>
<td>Using Diffusion of Innovation Theory Attributes to Predict Intention to Click, Try, and Share HappyHealthy Physical Activity Posts on Facebook</td>
</tr>
<tr>
<td>3RD</td>
<td>Jadyn Bowen (109)</td>
<td>Food Science, Nutrition, and Health Promotion</td>
<td>C.O.N.N.E.C.T: Communities Overcoming Need through Nutrition Education, Collaboration and Training</td>
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The Office of Undergraduate Research and Creative Discovery extends gratitude to all Special Area Competition sponsors and judges for supporting student research. Special thanks to the following individuals, who created and hosted these competitions.

Jonathan Barlow, Ph.D.
Steve Bullard, Ph.D.
Chih-Chia Chen, Ph.D.
Jamie Dyer, Ph.D.
Steve Elder, Ph.D.
Cory Gallo, Ph.D.

Robert Green, Ph.D.
Lilli Harris
Deborah Lee, Ph.D.
Julia Osman, Ph.D.
Matthew Ross, Ph.D.
Holli Seitz, Ph.D.