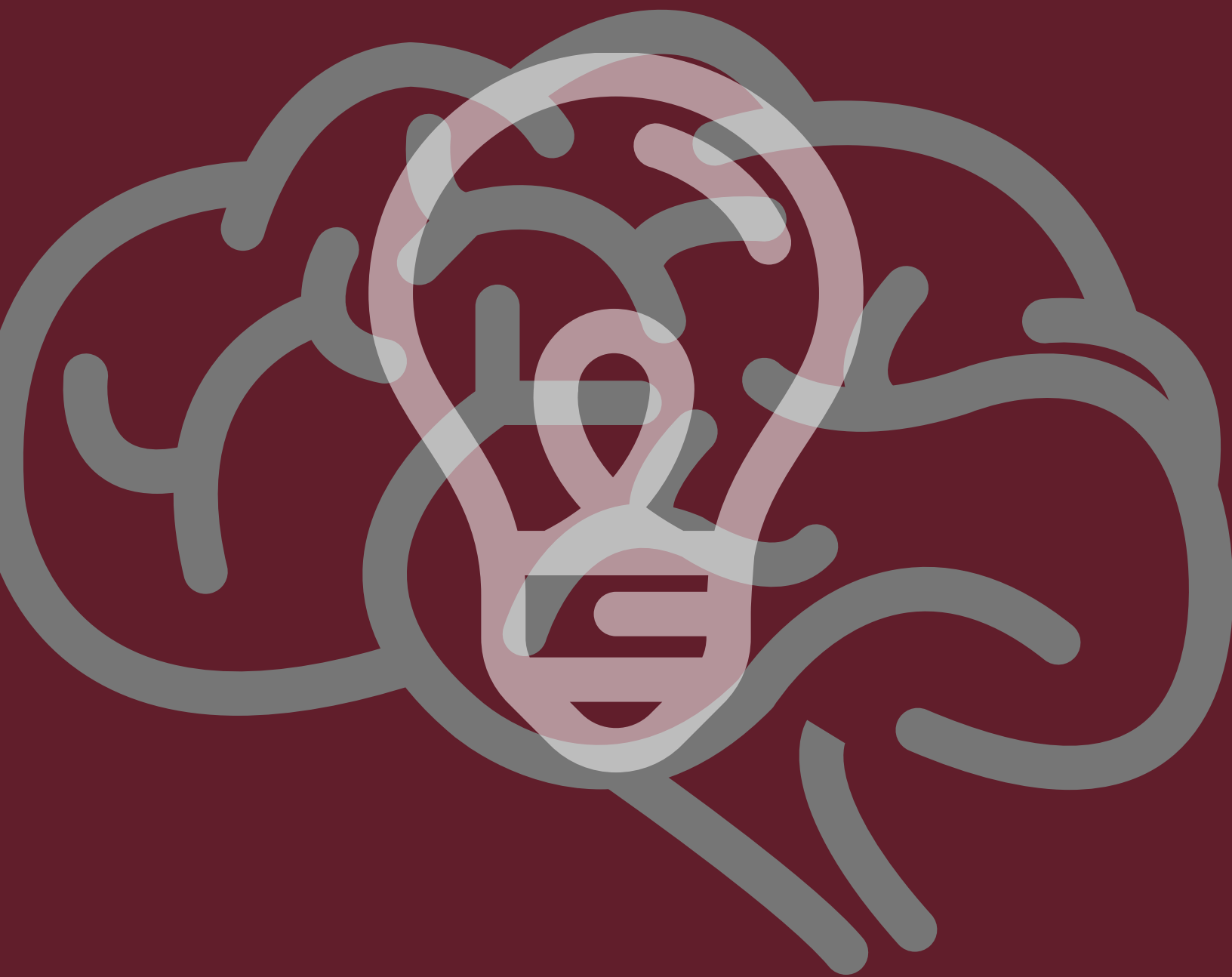


Spring Undergraduate Research Symposium

2016



MISSISSIPPI STATE UNIVERSITY™
JUDY AND BOBBY SHACKOULS
HONORS COLLEGE

Welcome

The Shackouls Honors College is pleased to sponsor the spring 2016 Mississippi State University Undergraduate Research Symposium. Prizes for academic areas are being partially supported by Phi Kappa Phi. The Shackouls Honors College has provided summer research support to some of the students presenting with additional funding from the Mississippi State University Office of Research and The National Strategic Planning & Analysis Research Center (nSPARC).

In recognition of Mississippi State University's Carnegie Community Engagement Classification, the Undergraduate Research Symposium is pleased to be continuing to include Community Engagement track included in the symposium.

We view the encouragement and support of undergraduate research for all students to be part of our core mission. Just as a good liberal education broadens the mind, provides students with a common core of knowledge, and familiarizes them with the basic methodologies of the various academic disciplines, undergraduate research allows students to dive deeply into important ideas and topics in a rigorous and creative way, paving the way for future intellectual work and exploration whether in the academy, business, or other life arena. Enjoy the student posters and presentations and come away knowing more than when you entered our doors.

Dr. Seth F. Oppenheimer, Professor of Mathematics and Director of Undergraduate Research,

Shackouls Honors College



MISSISSIPPI STATE
UNIVERSITY™

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

We are honored to welcome you to Mississippi State University's 2016 Undergraduate Research Symposium. Undergraduate students are an integral part of the multi-faceted research underway at Mississippi State.

Every day, our faculty, staff, and students are conducting fundamental to applied research that provide innovative solutions, creative works, and new scholarship that address pressing local, state, regional, national, and global needs.

As a result of this work, MSU is the flagship institution in our state for research that falls within its land-grant mission. Strengths across all colleges and research centers have led to our institution being categorized by the Carnegie Foundation as a "high research activity" institution. The Carnegie Foundation has also recognized Mississippi State with its Community Engagement Classification.

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

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

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

David R. Shaw, Ph.D. Vice President for Research and Economic Development

Research seems to expand mankind's knowledge. Students who participate in research projects develop skills and analytical abilities that enhance their learning and growth. On behalf of the Center for the Advancement of Service-Learning Excellence (CASLE), a partnership between the Office of the Provost and the Mississippi State University Extension Service, I would like to commend the students and their faculty mentors for submitting abstracts based upon their research in or the creative scholarship generated through their community engagement efforts. Service-learning provides students with a way to meet their academic course objectives by participating in meaningful community service. The Community Engagement Track of the Undergraduate Research Symposium highlights these efforts and allows us to celebrate the work that can be accomplished through our community partnerships.

We congratulate you on your accomplishments, and we look forward to working with you in your future growth.



Dr. Rodney Pearson
Interim Director
Center for the Advancement of Service-Learning Excellence (CASLE)

THE HONOR SOCIETY OF
PHI KAPPA PHI

The Honor Society of Phi Kappa Phi (PKP) has a long and distinguished history. Currently, there are over 300 chapters of PKP scattered all across the world, from Maine to Hawaii and the Philippines, and from Alaska to Puerto Rico and beyond. During the 1996-97 academic year, PKP celebrated the 100th anniversary of the founding of The Honor Society of Phi Kappa Phi, and we are now in the second century of its recognition of - and service to - learning. The MSU chapter is in its 64th year of membership. Due to PKP's prestigious recognition and support of learning, the MSU Chapter is proud to also financially support the Spring 2016 Undergraduate Research Symposium in Griffis Hall at Mississippi State University. As President, I am honored to attend this event and experience undergraduate research at MSU at its best!

Thanks,

Dr. Steve Grado, President

Schedule

Poster Sessions:

1:00-3:30 pm – Griffis Hall (2nd, 3rd, & 4th Floors)

Concurrent Talks (^ indicates Technology is needed)

These are 10 minute talks. One or two questions are allowed but time needs to be left for the next speaker to set up

Arts and Humanities: Room C401

1:00 -- Ryan Williams: *Cicero and Epicureanism*

1:15 -- Oliver Peloquin: *New Orleans and the Texas Revolution*

1:30 -- Lien Van Geel: “*Could you expect me to rejoice in the inferiority of your connections?*”: *The (Seeming) Importance of Social Status and Money in Pride and Prejudice*

1:45 -- **Break**

2:00 -- Rachel Laird: “*Don’t Belong Anywhere*”: *A Reader Response to Biracialism in To Kill a Mockingbird and the Modern South* ^

2:15 -- Leslie Howard: *Is saccade-induced retrieval enhancement a potential means of decreasing the cross-race effect in eyewitness identification?* ^

2:30 -- Emily Turner: *The Application of Architectural Theory to Multifamily Housing Through a Feminist Lens* ^

Biological Sciences and Engineering I: Room C201

1:00 -- Andrew House: *Investigating Environmental Effects on Physiological Responses in Alligator Gar* ^

1:15-- Ruth Fowler: *Effective Uses of Chitosan-Bonded Biochar as a Lead and Nutrient Adsorbent* ^

1:30 -- Emerald Ford: *Characterization of genes associated with antibacterial activity of *Curtobacterium* sp. strain MS163 against bacterial pathogen *Erwinia amylovora** ^

1:45 -- **Break**

2:00 -- John Laws Ferguson: *Male giant panda volatile profile response to female estrus urine* ^

2:15 -- William Whitfield: *Light Weight Roller Technology Impacts on Ultradwarf Bermudagrass Putting Greens*

2:30 -- Lucas Ferguson: *Pathogenesis of Influenza D virus in Cattle* ^

Biological Sciences and Engineering II: Room C305

1:00 -- Tate Fonville: *A Safer Football Helmet* ^

1:15 -- Amanda Harper: *Microscopic analysis of Rickettsial co-infection in the Gulf Coast tick, Amblyomma maculatum* ^

1:30 -- Malcolm Brooks: *Isolation, Persistence, and Resuscitation of Salmonella in Sweet Potato Soils* ^

1:45 -- **Break**

2:00 -- Erin Wilson: *Resistance to Acetolactate-synthase (ALS) Inhibitor in Annual Bluegrass (Poa annua): Mechanisms and Plate Assay for Rapid Detection* ^

2:15 -- Gabrielle Rands: *The In Vitro Effects of Glucosamine on Equine and Canine Platelet Aggregation and Thromboxane Synthesis* ^

2:30 -- Hannibal Brooks: *Effect of a Bacillus subtilis probiotic inclusion with and without coccidiosis control on d 0-14 male Ross x Ross 708 broiler performance* ^

Biological Sciences and Engineering III: Room C307

1:00 -- Alexis Manson: *Identification and Analysis of Volatile Organic Compounds in Macrophomina phaseolina (Charcoal Rot Fungus) in Sweet Potato Root Isolate* ^

1:15 -- Emmy King: *Impact of housing type and probiotics on growth and performance of dairy calves* ^

1:30 -- Kellie Mitchell: *Altered clock gene oscillations in cardiac fibroblasts from obese and diabetic mice* ^

1:45 -- **Break**

2:00 -- Alexis Montgomery: *Effect of antral follicle count on growth characteristics of follicles and concentrations of steroid hormones in follicular fluid of beef cows* ^

2:15 -- Pieter Both: *Effect of Pcp1p mutations on mitochondrial respiration, mitochondrial DNA maintenance, and mitochondrial morphology* ^

2:30 -- Folly Crawford: *In Silico Molecular Dynamics of Neuron Membrane Stress and Failure due to Mechanical Insult*

Physical Sciences and Engineering: Room C407

1:00 -- Eric Stallcup: *The Development of an Inexpensive, High-Velocity Sounding Rocket* ^

1:15 -- Kris Madsen: *Relativistic Twisted Electron Mott Scattering*

1:30 -- Taylor Brown: *Strain Analysis in the Soles of Nike Shoes*

1:45 -- **Break**

2:00 -- Olivia Todd: *Removal of Lead and Cadmium from Wastewater Using Magnetic Rinsed Ultra Bio-char* ^

2:15 -- Ronald LaCour: *Ligand Displacement from Gold Nanoparticles Using Sulfide* ^

2:30 -- Elizabeth Stafford: *Molecular Layer-by-Layer Assembly of Polyamide Thin Films* ^

2:45 -- Cody Price: *Synthesis of MTSL-Labeled Elastin-Like Proteins for Paramagnetic NMR & EPR*

3:45 -- Awards Ceremony: 4th Floor Forum Room

Moderator: Seth F. Oppenheimer

Featured speaker: Erdoğan Memili, Associate Professor of Animal and Dairy Science

Subject Area Awards: Dr. Stephen C. Grado, George L. Switzer Professor of Forestry, Phi Kappa Phi

Community Engagement Awards: Michelle Garraway, Program Coordinator, The Center for the Advancement of Service-Learning Excellence (CASLE)

This symposium would not be possible without the hard work of the judges who work under time pressure to try to determine which excellent project is just a bit more excellent than the others.

If you see a judge, thank him or her.

Abstracts

*** = Community Engagement Tracking

PSE-01

Name, Major: Grant Abbey, Electrical Engineering

Project Name: *CodeChat: A Programmer's Word Processor*

Faculty Advisor, Department: Bryan Jones, Electrical and Computer Engineering

Project Type: Poster

Project Category: Physical Sciences and Engineering

Abstract: CodeChat is a Literate Programming (LP) software currently under development by Dr. Bryan Jones of Mississippi State University's ECE department. Literate Programming is a concept developed by Donald Knuth in 1992 that calls for accurate and informative documentation of any codebase. Rather than code be simply written until it is operational, it should be constantly described by the programmer in an accessible form. Based on this principle, CodeChat is used for programmers to represent their code in a readable form by translating the code into a well-formatted, descriptive document. Currently CodeChat is able to convert source code to documentation (part 1), and is continuing to be developed to allow changes in the user document to be translated into source code (part 2). Overall, CodeChat is intended to extend upon LP principles currently in practice, and to develop a tool that allows programmers and non-programmers alike to view and modify source code efficiently. Continuing development requires extensive cleanup and implementation analysis of the CodeChat source code. By reflecting on design principles in part 1 of development and modifying the code to operate more efficiently, the transition to part 2 will more concise. This is a project involving research into advanced LP methods, along with discovery of currently available tools that may contribute to this process. Research will primarily be in software development, including analysis and design of the CodeChat software.

SS-01

Name, Major: Audrey Alexander, Psychology

Project Name: *Guilt and Exploitation: Differences Between Virgins and Non-Virgins*

Faculty Advisor, Department: Kristina Hood, Psychology

Project Type: Poster

Project Category: Social Science

Abstract: Previous research shows that heterosexual women are not as psychologically satisfied with first sexual intercourse as men (Darling, Davidson, & Passarello, 1992) and experience more guilt than men after first sex (Sprecher, Barbee, & Schwartz, 1995). Further, virgins and non-virgins perceive sex differently (Bersamin et al., 2007), which may lead to differences in feelings of guilt and exploitation. Limited research has examined differences in beliefs about first sex will be and how it actually is. The current study sought to explore differences in guilt and exploitation at first sex between men and women and virgins and non-virgins. Undergraduates (N = 364) completed an online study, which contained the First Coital Affective Reaction Scale (FCARS; Fisher, Davis C., Yarber, and Davis S., 2010). Individuals also provided their gender, as well as their virginity status (i.e., virgin or non-virgin). Two two-way ANOVAs included gender and virginity status as independent variables. The first measured the anticipated or reported feelings of guilt. Results revealed main effects for gender, $F(1, 360) = 27.47, p$

SS-02**Name, Major:** Jessica Baker, Human Sciences**Project Name:** *The Effect of Self-Esteem Derived from the Lack of Clothing Options and Resources Among Adolescent Females***Faculty Advisor, Department:** Joe Wilmoth, School of Human Sciences**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Teen girls who are between the ages of 12 to 14 years old seem to struggle with their self-esteem worse than any other age group. This is the age when females begin to build their identities in comparisons to others and their appearance (Thompson 2009). Within adolescents, especially females, are prone to having more body image and self-esteem issues (Potts & Mandelco,). For the adolescent age, the psychoanalytic theory presented by Erik Erikson is Identity vs. Role Confusion (Thompson, 2009). During this time, many teen females choose to express themselves mostly through the clothing they choose to wear. The level of self-esteem issues arises due to the lack of resources and availability of clothes. Generally, for young females with the lack of resources and clothing options their self-esteem and self-worth dwindles down as they begin to define their identity with minimum resources. For example, Bannister and Hogg stated the motivation of maintaining positive self-esteem tends to encourage or discourage individuals from consuming certain products, brands, and styles of clothing, because they are concerned with presenting themselves in the best light through their clothing choices (Beaudoin & Lachance 2006).

BSE-01**Name, Major:** Hamsini Balaji, Biochemistry**Project Name:** *Promotion of stomatal opening in the crassulacean acid metabolism plant Kalanchoe laxiflora by calcium chelator***Faculty Advisor, Department:** Jiayu Li, Biochemistry & Molecular Biology**Project Type:** Poster**Project Category:** Biological Sciences & Engineering

Abstract: Crassulacean acid metabolism (CAM) is a carbon fixation pathway that evolved in some plants like cacti, pineapple, and vanilla as an adaptation to arid conditions. By only requiring the stomata to be open during the (cooler) night for carbon dioxide uptake and keeping stomata closed during the (hotter) day, the CAM plants lose much less water. However, it is still not understood how CAM plants open their stomata during the night. In non-CAM plants, calcium is known to have an inhibitory effect on stomatal opening. In this study, we analyzed the effect of the calcium chelator EGTA (ethylene glycol tetraacetic acid) on stomatal opening in the CAM model species Kalanchoe laxiflora. We found that the calcium chelator EGTA promoted stomatal opening of Kalanchoe laxiflora in darkness. Considering the nocturnal accumulation of malate and citrate in most CAM plants, accumulated malate and citrate may play an important role in stomatal opening during the night in CAM plants by chelating calcium. Further investigation of malate and citrate in stomatal regulation in Kalanchoe laxiflora will pinpoint the molecular mechanism that controls diel stomatal cycle in CAM plants.

BSE-02**Name, Major:** Josh Bankston, Forestry/Forest Management**Project Name:** *Hickory Leaf Litter Alters Decomposition Rates in Upland Oak Forests of the Southeastern U.S.***Faculty Advisor, Department:** Heather Alexander, Forest Ecology**Project Type:** Poster**Project Category:** Biological Sciences & Engineering

Abstract: Many forests of the Central Hardwood and southern Appalachian region have been oak dominated, but now, many forests are shifting from oak dominance and towards mesophytic species, known as mesophication. Mesophication is the process of altering microenvironmental conditions to be more prone to dampness, shade, and moistened environments, thus promoting conditions favoring mesophytic fire-intolerant species. Mesophytic species are thought of being red maple or sugar maple, but evidence now suggests hickories (*Carya* spp.) may behave in similar ways. The primary objective of this study is to determine how increased hickory abundance in an upland oak forest of northeast Mississippi affects leaf litter decomposition rates. To address this objective, we used a traditional litter bag study to emulate increasing hickory leaf litter abundance, and hence mesophication, of these forests. The design included five leaf litter treatments: 100% white oak (section *Leucobalanus*), 100% red oak (section *Erythrobalanus*), 100% hickory, 66% hickory + 33% equal mix white and red oak, 33% hickory + 66% equal mix white and red oak. Over the course of five years, litter content will be assessed at 3 to 6 month intervals and data will be collected regarding decomposition rates (mass loss) and litter chemistry (carbon and nitrogen). Preliminary combustion analysis shows that hickory leaf litter has a lower C:N ratio of 27.4:1 than oak species which has a C:N ratio of 35.5:1, inferring that litter from *Carya* spp. would decompose more quickly than oak leaf litter. The first collection for the litter bag study occurred after a 3 month time period and combustion analysis was performed. Analysis yielded results showing that hickory, on average, lost approximately 5% more litter mass than oak species. These findings suggest that as *Carya* spp. litter increases, decomposition rates will increase and possibly reduce fuel loads, resource availability, and promote hickory expansion.

AH-01*****Name, Major:** Anna Barr, Architecture**Project Name:** *Continuing to Improve on Outreach Design***Faculty Advisor, Department:** Alexis Gregory, School of Architecture**Project Type:** Poster**Project Category:** Arts & Humanities

Abstract: The field of architecture has the opportunity and responsibility to serve the community. Architects are challenged with catering to the needs of specific communities, such as the Oxford-Lafayette area, while also improving the residents quality of living. I conducted continued research for the Habitat for Humanity of Oxford-Lafayette, taking the house designs developed through a collaborative research project. The original research was conducted by me and two other architecture students in Fall 2014/Spring 2015 and funded by an Oxbridge Tutorial. The research team conducted preliminary research into previously constructed Habitat for Humanity houses, building code, zoning requirements, ADA and egress requirements, and site analysis, including solar orientation and wind direction. The team then brought in student volunteers from the American Institute of Architecture Students (AIAS) to participate in a 4 hour design service-learning immersion project. The purpose of this design project was to establish a relationship between the students and the community for the betterment of both through equal cooperation. This current project used the AIAS student designs to create construction drawings to make the house designs fully useable. To do this, I created mechanical and plumbing drawings, further developed the floor plans, and drawing details for the physical construction of the houses. The continuation of this project will further the efficiency and cost effectiveness of the houses. This project will not only give Habitat for Humanity the designs for two homes, but these houses will also serve as prototypes for the betterment of Habitats overall outreach goals of making better designed homes available to low income families. The implementation of our prototype houses will help enrich the community through the influence of better designed low income housing.

SS-03

Name, Major: Brittany Barton, Psychology

Project Name: *Generating Predictive Inference in the Face of Uncertainty*

Faculty Advisor, Department: Jarrod Moss, Department of Psychology

Project Type: Poster

Project Category: Social Sciences

Abstract: When reading narrative stories about familiar situations, people often make predictive inferences about what may happen next in order to facilitate comprehension of the story. Prior research has shown that people will naturally generate predictive inferences when the text highly constrains the inference to be made, when they have sufficient prior knowledge about what may happen next, and when there are few, if any, alternative possible consequences. However, recent research has shown that people generate predictive inferences even when there are alternative consequences available and the story is less constrained toward the target inference. In the present study, a condition was created in which the main and alternative inferences were equally likely to occur. Participants read 24 stories, each randomly assigned to one of four conditions: highly predictive that the target inference would occur, highly predictive that the alternative inference would occur, mutually predictive that either the target or alternative inference would occur, or a control condition that was not predictive of either inference. The story was followed by the presentation of the target or alternative probe word, and the naming times for the probe words were measured to determine whether or not a predictive inference had been activated in working memory. If the inference was activated in working memory, then the probe word would be named faster than if it was not activated. Replicating prior research, naming times for the target probe words were faster following the highly predictive stories than following the control stories. There were no differences in the naming times between the mutually predictive and control conditions. The results indicate that the increased likelihood that the alternative inference would occur in the mutually predictive condition, as compared to prior research, results in interference between the target and alternative inferences.

BSE-03

Name, Major: Steven Basham, Kinesiology

Project Name: *Effect of Carbohydrate Ingestion on Blood Catecholamine Levels from Combined Mental and Physical Stress*

Faculty Advisor, Department: Matthew McAllister, Kinesiology

Project Type: Poster

Project Category: Biological Sciences and Engineering

Abstract: Introduction: Combined mental and physical stress can contribute to significant increases in catecholamines (epinephrine and norepinephrine) which could result in the production of pro-inflammatory cytokines. This has been linked to increase risk for cardiovascular disease among individuals working in high stress occupations (e.g., firefighters, military personnel). The purpose of this study was to investigate the effect of carbohydrate (CHO) ingestion on plasma catecholamine levels from combined mental and physical stress.

Methods: Sixteen apparently healthy males 21-30 years old ingested a 6.6% CHO beverage or non-CHO beverage 15 minutes prior to completing a mental and physical stress challenge. The combined stress challenge consisted of mental stress that was performed during steady state exercise (60%VO₂peak). Mental challenges consisted of mental arithmetic as well as Stroop color word performed on a computer during exercise. Blood was drawn 10, 20, 30, and 35 minutes after the start of exercise and 15 minutes' post exercise and analyzed for levels of catecholamines. A 2 x 6 (treatment x time) repeated measures ANOVA was conducted for epinephrine and norepinephrine. A Tukey post hoc was used in the instance of a significant main effect ($p < 0.05$).

Results: There was a significant change in epinephrine levels during exercise ($p < 0.0001$) but no treatment effect ($p = 0.317$). There was a significant change in norepinephrine levels over time ($p < 0.0001$) but no treatment effect ($p = 0.7062$).

Discussion: The combined stress challenge resulted in a significant elevation of both catecholamines which was not affected by CHO ingestion. The results demonstrate that the mental stress challenge was effective at increasing activation of the sympathoadrenal axis. This is apparent since exercise at this level of intensity typically does not result in significant increases in catecholamines. Future research should continue to investigate dietary interventions which can improve catecholamine responses to these stress challenges.

BSE-04**Name, Major:** Heath Baskin, Biological Engineering**Project Name:** *Bio-Mechanical Characterization of Porcine Aorta***Faculty Advisor, Department:** Jun Liao, Tissue Bioengineering Laboratory**Project Type:** Poster**Project Category:** Biological Sciences & Engineering

Abstract: The American Heart Association reports that aortic aneurysms were the primary cause of 10,597 deaths and a contributing cause in more than 17,215 deaths in the United States in 2009. These aneurysms can occur in two ways. The force of blood pumping can split the layers of the artery wall, allowing blood to leak in between them through a process called dissection. The second way is called a rupture. This is where the aneurysm can burst completely, causing bleeding inside the body. Dissections and ruptures are the cause of most deaths from aortic aneurysms. My aim was to study heart bio-mechanics specifically pertaining to the viscoelastic properties of the aorta to gain a better understanding of its mechanical behavior. Characterization of the bio-mechanical behavior of the aorta would provide a potential tool for the prediction of growth and rupture of aneurysms and subsequently can help clinicians in their decision making. I obtained porcine hearts from a local abattoir. Dog bone shape samples were then dissected from the aorta in both the circumferential and longitudinal directions. Each strip was subjected to a stress-relaxation test within the physiological range of the tissue. The strip was then further subjected to a creep test within the physiological range of the tissue. Finally, the aorta was pulled to failure. These tests are vital in the characterization of the aorta because they help us understand the aorta as it undergoes repetitive stress from the load of blood pressure. Once the tests were completed, the data was quantified and analyzed in order to accurately characterize the mechanical and viscoelastic properties of the aorta. I hope that the final result is both revealing and profitable to those seeking to better understand heart bio-mechanics and to the field of bio-medical engineering as a whole.

BSE-05**Name, Major:** Chrysta Beck, Poultry Science**Project Name:** *Injecting GalliPro Hatch into Broiler Hatching Eggs using Commercial in ovo Technology and its impact on Hatchability and Early Chick Mortality***Faculty Advisor, Department:** Aaron Kiess, Poultry Science**Project Type:** Poster**Project Category:** Biological Sciences & Engineering

Abstract: As concerns with antibiotic resistant bacteria continue to grow, alternatives are being investigated. Probiotics, as a poultry feed additive, have improved bird performance, immune health, and reduced pathogens. Traits may be further improved if probiotics can be provided to embryos before being exposed to pathogens at the hatchery. The objective of this study was to determine if a new probiotic formulation (GalliPro Hatch) can be injected into fertile hatching eggs using commercial Inovoject technology without negatively impacting hatchability or 7 d mortality. Hatching eggs (3906) from a 55wk-old Ross 708 breeder flock were incubated. On d 10 of incubation, infertile, cracked and contaminated eggs were removed. On d 18, eggs were assigned treatments: 1) non-injected control, 2) injected with Marek's vaccine (50 μ l), or 3) injected with Marek's vaccine and 1.4×10^7 cfu of GalliPro Hatch (50 μ l) using Inovoject technology. On d 21, hatched chicks were counted, feather sexed, weighed and hatch residue analysis was conducted. Male chicks (681) were randomly assigned to 36 pens containing used litter (12 blocks of 3 pens each). There were no differences in set egg weight, chick weight, hatch of fertile, infertility, mid deaths, pips, cracked eggs, contamination, or 7 day mortality ($P > 0.13$). However, the percentage of late dead mortality in treatments 2 and 3 were greater than the non-injected control ($P = 0.019$) which could be a result of the in ovo inject process. Although statistical differences were not found for hatchability, chick weight, or 7 d mortality, the GalliPro Hatch treatment did demonstrate numerical improvements compared to the Marek's vaccine treatment. In conclusion, injecting GalliPro Hatch into fertile hatching eggs does not decrease hatchability and may provide the unhatched chick an advantage in performance attributes in the grow-out facility, especially if exposed to pathogens.

PSE-02**Name, Major:** Tylon Beckwith, Industrial Engineering**Project Name:** *Continuous Approximation Approach for an Integrated Facility-Inventory Allocation Model in a Disaster Affected Scenario***Faculty Advisor, Department:** Mohammad Marufuzzaman, Industrial and Systems Engineering**Project Type:** Poster**Project Category:** Physical Sciences & Engineering

Abstract: This research pertains to optimization of an integrated facility-inventory allocation model in a disaster affected scenario. It focuses on minimizing the total network cost by obtaining key decisions i.e., where to locate transportation centers, how to assign customer demand points to each center, and what should be the inventory policy at different stages of network. Drones are used along with trucks as available modes of transportation due to its usefulness in serving disaster affected regions where trucks can't reach. Once all data is collected, a continuous approximation approach is used to solve the resultant non-linear model. Coastal Mississippi areas are used as a test bed to validate the performance of this model as this region is historically prone to various natural disasters. A number of sensitivity analysis have also been performed to investigate the effect of different parameters on the performance of the model.

AH-02**Name, Major:** Morgan Beech, Human Sciences (Apparel Textiles and Merchandising)**Project Name:** *The Pillbox Hat***Faculty Advisor, Department:** Charles Freeman, Fashion Design and Merchandising**Project Type:** Poster**Project Category:** Arts & Humanities

Abstract: The pillbox hat has come to represent a golden, yet tragic time in American history as a reminder of former First Lady Jacqueline Kennedy Onassis and the presidency of John F. Kennedy. The tragic sight of Mrs. Kennedy in a blood stained pink suit and pillbox hat is one that most people are painfully familiar with. The history and popularity of this style of hat is far from tragic and is actually very interesting. This particular pillbox hat, obtained by the university through a personal donation, was part of Emily Whites wedding ensemble in 1969. The hat is covered in organza that was taken from the hem of a dress. The wedding veil which is not included was from the famous Lace Shop of Maria Loix. The veil was a traditional cathedral- length Brussels rose point lace. The hat is an open pillbox, with two combs attached for decoration. Although the hat is slightly discolored it remains in good condition. This poster session will include photographs of the hat, a brief history and the historical significance of the hat in ladies fashion and as a symbol of a historical period and details of the hats construction and materials.

BSE-06**Name, Major:** Parker Berthelson, Biological Engineering**Project Name:** *A Study on the Mechanical Response of the Human Head during Single-Collision Car Crashes using Finite Element Analysis***Faculty Advisor, Department:** Raj Prabhu, Agricultural & Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences & Engineering

Abstract: Traumatic Brain Injury is a leading cause of injury-related deaths in the United States [1], many of which stem from vehicular collisions [2]. Finite Element (FE) modeling has become a viable alternative to expensive and dangerous physical testing in a large portion of crashworthiness-based research [3]. The use of FE simulations allowed Deng, et. al. [3] to investigate the effect of a single-collision car crash on the human brain. To improve upon this study [3], the authors are employing a two-step method to determine the various crash scenarios that affect the human brain. In the first step, each FE simulation begins with a moving barrier at one of the 12 starting locations and a crash test dummy seated in the drivers seat of a Dodge Neon (TM). For each of the starting locations, the moving barrier struck the Dodge Neon at seven different impact velocities. Upon completion of these simulations, the acceleration versus time profiles at the centers of gravity of both the head and the neck of the dummy will be determined for each scenario [3]. In the second step, a more anatomically accurate, high-fidelity FE model of the human head will be created, using Deng et. al's model [3] as the baseline. Using the acceleration versus time profiles as boundary conditions, the movement of the head will be simulated to determine the brain injury metrics upon impact. [1] Finnie, J., & Blumbergs, P. (2002). Animal Models: Traumatic Brain Injury. *Veterinary Pathology*, 39(6), 679-689. [2] Traumatic Brain Injury in the United States: Fact Sheet. (2015, January 12). [3] Deng, X., An Chen, S., Prabhu, R., Jiang, Y., Mao, Y., & Horstemeyer, M. (2014). Finite Element Analysis of the Human Head Under Side Car Crash Impacts at Different Speeds. *Journal of Mechanics in Medicine and Biology*, 14(6). doi:10.1142/S0219519414400028

SS-04**Name, Major:** Morgan Bishop, Secondary Education (Mathematics)**Project Name:** *Movement in the Classroom and Its Effects on Emotional States of Students***Faculty Advisor, Department:** Kay Brocato, Education Psychology**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Current and upcoming students live in a very different world than students from two decades ago. Obesity rates have skyrocketed and schools are forced to abandon the health concerns of their students to fulfill increasingly stringent curriculums, focusing on preparing students for a modern workforce. This includes not allowing students to slip through the cracks ensuring that they are competitive in both college and the workforce. However, in order to reach all these new standards, physical education and recess time have been shortened. Core content classrooms have been creative in their instruction methods and have covered the difference by including physical activities and brain breaks into their instruction. Past research has shown these to have a positive effect on retention rates, especially for students who are overweight. This research sets out to examine how the concept of movement in the classroom is affecting students emotions, their coping abilities, and stress levels. Each participant completed the STAIC C1 and C2 approximately six times total. Their responses were analyzed quantitatively and again at a deeper level qualitatively. The results can be implemented in all classrooms, secondary STEM classrooms specifically, in order to create a more effective holistic teaching styles.

AH-03**Name, Major:** Alvaro Bizao, Civil Engineering**Project Name:** *Analysis to Suspended Sediments in the Catalpa Creek, MS***Faculty Advisor, Department:** John J Ramirez Avila, Civil and Environmental Engineering**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: The Catalpa Creek Watershed has been included in the MS list of impaired waterbodies due to sediments. The purpose of the study is to determine the spatial and temporal variability of suspended sediments for the Catalpa Creek. The work consisted first in collecting water samples at certain points along the Catalpa Creek and others smaller tributary streams. Streamflow velocities, water quality assessments and water samples are collected bi-weekly. Laboratory analyses are completed to determine the sediment concentration in the stream at the different locations. Data interpretation would help to determine the processes driving sediment export from the watershed.

BSE-07**Name, Major:** Rachel Bobo, Undeclared**Project Name:** *Molecular variation of the Nod factor receptor Nfr5 does not reflect specificity between legumes and their nitrogen-fixing bacterial symbionts***Faculty Advisor, Department:** Lisa Wallace, Biological Sciences**Project Type:** Poster**Project Category:** Biological Sciences & Engineering

Abstract: Through symbiotic relationships with nitrogen-fixing bacteria, legumes can efficiently access proper nitrogen for growth. Effective symbioses are formed after nodulation (Nod) factors are released by the bacterial symbiont to initiate symbiosis. Host plant receptors, including *Nfr1* and *Nfr5*, are among the earliest coding genes to respond to Nod factors and establish symbiosis in the roots of legumes; these regulating receptors may therefore be useful in determining symbioses specificity and host choice. The objective of this study was to test the hypothesis that host plants that associate with genetically diverse rhizobia symbionts are able to do so because they harbor genetic diversity at Nod factor receptors involved in establishing symbioses. To test this hypothesis, DNA sequences of a portion of the *Nfr5* gene were assessed in *Chamaecrista fasciculata* host plants containing multiple nodules with either genetically divergent or genetically similar rhizobia. Plants forming symbiosis with more divergent rhizobia were expected to exhibit higher levels of diversity in *Nfr5* compared to plants with more similar rhizobia. Contrary to expectation, host plants in the two groups exhibited similar levels of diversity (divergent group nucleotide diversity (π) = 0.00691, haplotype diversity (Hd) = 0.9942; non-divergent group π = 0.00540 and Hd = 1.0. No signal of adaptive evolution in *Nfr5* was found in *C. fasciculata* either. The high degree of diversity found in *Nfr5* may underlie the broad symbiotic tolerance of *C. fasciculata* across *Bradyrhizobium*. It is also likely that other genes are involved in recognizing suitable rhizobia for symbioses in this host species. Future studies will include analysis of other genes present in host plant interactions with bacterial Nod factors to further knowledge of how legumes and rhizobia establish symbioses.

SS-05**Name, Major:** Samantha Booker, Psychology**Project Name:** *The Influence of Gender Roles of Military Leadership***Faculty Advisor, Department:** Kristina Hood, Clinical Psychology**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Abstract Despite research showing that gender has minimal effect on leadership ability, negative perceptions of women holding leadership positions persist. These perceptions preclude women from obtaining leadership roles, especially in the military. Role congruity theory suggests that since individuals in military settings view ideal military leadership as masculine, incongruity between feminine gender roles and leadership roles occurs (Bouldry, Wood, & Kashy, 2001; Eagly & Karau, 2002) The leadership effectiveness of women in the military is rated less favorably compared to the men in the same position (Bouldry et al., 2001). Individuals own adherence to gendered traits may also affect attitudes toward women in leadership; more masculine individuals tend to hold more sexist ideals, while more feminine individuals hold more egalitarian views (Lemaster et al., 2014). The current study explored how individuals own gender roles influence attitudes toward women in leadership. An online survey of college undergraduates (N=491) included the Bem Sex Role Inventory, an adapted version of the Gender and Authority Measure, and asked participants to report their gender. A hierarchical regression yielded that gender predicted preference for men in military leadership positions, such that that men are more likely to prefer men in military leadership positions. After controlling for gender, feminine gender roles significantly predict preference for men in military leadership positions, such that those with stronger endorsement of feminine gender roles are less likely to prefer men in military leadership positions, even when controlling for gender, $b=-.043$, $t(2, 489)=-2.086$, $p=.038$. However, endorsing masculine gender roles was not a significant predictor. Results suggest that individuals adherence to feminine traits influence attitudes toward women in military leadership. These findings provide a better understanding of factors that impact negative attitudes toward women in leadership, which should be taken into account when creating campaigns for gender equity.

AH-04**Name, Major:** Eric Boyd, Human Sciences (Apparel Textiles & Merchandising)**Project Name:** *Silk Shirtwaist***Faculty Advisor, Department:** Charles Freeman, Human Sciences**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: Fashion is constantly evolving from previous creations. In the early 20th century, a popular item was the waist. The waist is a women's blouse that stops at the waist (Dolan, 86). This piece was considered fashionable by women until a decline in 1909, due to strikes from factory workers (American Exp). The strike occurred in the United States, and did not effect other countries. The haute couture waist was inspired from the Victorian era, and the men's shirtwaist (Picken). The sleeves are stuffed with gathering to give a unique puffy sleeve. The sleeve is also a significant part in identifying the creation date of the waist. The sleeve on the waist we have is long, but basic compared to waist of 1906. The waist of 1906 have special trims, embroidery, and button finishes (Dolan 91). The waist identified with the new independent woman in the Progressive era in the United States. The blouse has the same aesthetic as man's dress shirt. The piece was functional, professional, and stylish. There were many different varieties for the waist in terms of color, and detailing (American Experience). Silk has always played a role in the history of waists. The wrinkles, low weight, and quality lead me to believe the waist is made of China Silk. China silk was once rare, and expensive due to it's exclusively; only being made in China. The shirtwaist was a popular, cultural piece that definitely made its mark in the history of fashion. The waist was the first piece that represented women independence. Woman worked and funded families like men. The shirtwaist was a great representation of the new upcoming role in society for women (American Experience).

BSE-T01**Name, Major:** Pieter Both, Biochemistry**Project Name:** *Effect of Pcp1p mutations on mitochondrial respiration, mitochondrial DNA maintenance, and mitochondrial morphology***Faculty Advisor, Department:** Donna Gordon, Biological Sciences**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Pcp1p is a protease in the mitochondrial inner membrane of *Saccharomyces cerevisiae*. Loss in Pcp1p function negatively impacts mitochondrial respiration due to defects in mitochondrial fusion and loss of mtDNA that arise from improper processing of the substrate, Mgm1p. We have investigated the impact that five *pcp1* mutants have on respiration, mtDNA maintenance, and mitochondrial fragmentation. “Functional”, “non-functional”, and “partially functional” mutants were identified. Functional mutants displayed normal respiration, mtDNA maintenance, and tubular mitochondria. The non-functional mutant displayed no respiration and large losses in mtDNA and mitochondrial membrane potential ($\Delta\psi$). qPCR data suggest preferential loss of *COX1* and *ATP6* over *COX3*. Loss in $\Delta\psi$ was attributed to mitochondrial fragmentation, although this was not directly tested. Partially functional mutants displayed normal mtDNA maintenance, elevated fragmentation, and respiration levels that varied from poor to normal. Additionally, there was variation in the processing of Mgm1p. The mutant that displayed poor respiration had higher amounts of s-Mgm1p as well as an aberrant form, s-Mgm1p*, than the partially functional mutant with normal respiration. The s-Mgm1p* is produced by an unidentified protease and accumulates in the absence of functional Pcp1p. Based on these data, we postulate that s-Mgm1p* has a dominant negative effect. Data also shows that the mutant with poor respiration has lower $\Delta\psi$ than the partially functional mutant with normal respiration. Both of these adequately maintained their mitochondrial genome, despite elevated fragmentation and loss of $\Delta\psi$ compared to WT. This suggests that the loss in respiration in these mutants may arise from mtDNA mutations and loss in mitochondrial transport. Both partially functional mutations and the non-functional mutation introduced a charged residue close to an active site and/or in a transmembrane region. This project highlights the importance of primary structure to rhomboid function and warrants further investigation into the role of Pcp1p in $\Delta\psi$ integrity.

PSE-03**Name, Major:** Ethan Brockmann, Mathematics**Project Name:** *The Independence Polynomial of Clawfree Graphs and Trees***Faculty Advisor, Department:** Russ Woodroffe, Math and Statistics**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: A paper by Alavi, Malde, Schwenk, and Erdős in 1987 conjectured that the independence polynomial of any tree is unimodal. I will present an (unsuccessful) attempt to prove that conjecture. I will also describe when the lexicographic product of two graphs is claw free.

BSE-T02

Name, Major: Malcolm Brooks, Food Science & Technology

Project Name: *Isolation, Persistence, and Resuscitation of Salmonella in Sweet Potato Soils*

Faculty Advisor, Department: Taejo Kim; Food Science, Nutrition, and Health Promotion

Project Type: Talk

Project Category: Biological Sciences and Engineering

Abstract: In the arena of food microbiology, Salmonella has long been a pathogenic organism of considerable concern. Its widespread distribution and ability to persist in fecally contaminated water and soil means that it could potentially pose a risk to the safety of agricultural commodities, such as sweet potatoes. Yet there exist few methods to effectively isolate Salmonella species from the sweet potato production field and processing environment. Previous work has failed to address the threat posed by viable but nonculturable bacterial cells that can go undetected in the insensitive assays used to confirm contamination. In this thesis, we sought to more adequately isolate Salmonella present in environmental samples via the application of a novel secondary enrichment formulation. Our experimental procedure compared the isolation rates of the USDA FSIS standard enrichments, Tetrathionate Broth and Rappaport-Vassiliadis Broth, against our mRV2 enrichment as well as real-time PCR, culminating in the serotyping of confirmed positive colonies with pulsed field gel electrophoresis. We expect this new formulation could displace the current methods to become the standard for rapid, accurate identification of Salmonella from environmental samples, while providing agricultural producers an affordable identification technique.

BSE-T03

Name, Major: Hannibal Brooks, Food Science & Technology

Project Name: *Effect of a Bacillus subtilis probiotic inclusion with and without coccidiosis control on d 0-14 male Ross x Ross 708 broiler performance*

Faculty Advisor, Department: Kelly Wamsley, Poultry Science

Project Type: Talk

Project Category: Biological Sciences and Engineering

Abstract: Debate continues over the effects of antibiotic usage in poultry, in an attempt to balance animal mortality with the risk of resistant bacteria; therefore, it is imperative to ensure that viable antibiotic alternatives, such as probiotic are effective. Their use in conjunction with coccidiosis control measurements (as well as without) are especially important. The objective of the current study was to determine if a *Bacillus subtilis* probiotic could improve starter bird performance when used alone or in conjunction with coccidiosis control. Basal diets were formulated to meet or exceed NRC recommendations and contained ingredients such as exogenous feed enzymes, corn, soybean meal, and a meat and bone meal blend. Treatments consisted of the following: Basal + antibiotic + coccidiosis control (Treatment 1); Basal + coccidiosis control (Treatment 2); Basal + coccidiosis control + 500,000 cfu/g of *Bacillus subtilis* (Treatment 3); Basal diet only (no additives; Treatment 4); Basal + 500,000 cfu/g of *Bacillus subtilis* (Treatment 5). On d of hatch male Ross x Ross 708 chicks were randomly and equally assigned pens, with a stocking density of 0.23 m²/bird. Measured variables included 0-14 d BW, BW gain, feed intake, FCR, and mortality. No significant differences were obtained for d 0 BW (P=0.5). For 0-14 d BWG and BW, birds fed Treatment 5 demonstrated improved performance to birds fed Treatments 1-4 (P<0.0001). In addition, birds fed Treatment 5 demonstrated a reduction in FCR by 4-7 points as compared to birds fed Treatments 3 and 1, respectively (P<0.0001). This data suggests that the tested *Bacillus subtilis* probiotic can be included into a practical diet without coccidiosis control and improve 0-14 d bird performance. However, in order to justify the use of the tested probiotic, it is important to verify that early performance benefits translate into improvements overall at the end of grow-out.

AH-05**Name, Major:** Bailey Brotherton, Psychology**Project Name:** *It's A Gift: Virginity, Sexual Attitudes, and Political Affiliation***Faculty Advisor, Department:** Kristina Hood, Psychology**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: Virginity is typically perceived in one of three ways: as a gift, as a stigma, or as part of a larger process (Carpenter, 1999). According to Carpenter's study, these perceptions vary based on gender and sexuality. However, it is still not understood *why* people of different genders and sexualities have disparate views of virginity. The beliefs that contribute to these conclusions have not been extensively studied. Some researchers have argued that the beliefs typically held by conservatives and liberals rest upon different sets of "moral foundation" (Graham, Haidt & Nosek, 2007). The purpose of this study was to ascertain whether sexual attitudes or political beliefs could significantly predict the perception of virginity as a gift. This online study was conducted with 393 undergraduate students attending a rural Southeastern public university. The sample consisted primarily of freshmen (44.9%), Caucasians (65.1%), and females (65.4%), with a mean age of 20.00 (SD = 2.739). A linear regression was employed to determine whether sexual attitudes could predict the perception of virginity as a gift. The results of this analysis found that sexual attitudes significantly predicted whether or not virginity was perceived as a gift, $R^2 = .041$, $F(2, 374) = 7.929$, $p < .001$. However, after controlling for political beliefs, the relationship between the perception of virginity as a gift and sexual attitudes was no longer significant, $R^2 = .064$, $F(3, 373) = 1.564$, $p = .119$. These results pose questions for future research about the relationship between political beliefs and beliefs about virginity as it relates to oneself and others. The public may benefit from an increased sensitivity to the relationships between our variables.

PSE-T01**Name, Major:** Taylor Brown, Aerospace Engineering**Project Name:** *Strain Analysis in the Soles of Nike Shoes***Faculty Advisor, Department:** Rani Sullivan, Aerospace**Project Typ:** Talk**Project Category:** Physical Sciences and Engineering

Abstract: This report discusses the strain analysis in the sole of running and sportswear shoes which are the Nike LunarGlide 6 and the Nike Cortez Basic Nylon 06, respectively. The soles observed were the midsoles and the outsoles of the shoes. Running shoes may have a Lunar, Interlock PU and Phylon, dual density Phylon, or Cushlon midsole, whereas a sportswear shoe may have the standard ethyl vinyl acetate (EVA) midsole. Because the outsole is the bottom of the shoe, it is not heavily analyzed. Since the analysis was based on strain rather than traction, the midsole was observed instead. The dual density Phylon from the running shoe category was compared to the EVA midsole through compression testing. Through these compression tests, it was possible to measure the strain within each midsole.

AH-06**Name, Major:** Reisa Bryant, Psychology**Project Name:** *Parenting Styles and Attachment in Custodial Grandchildren vs Foster Children***Faculty Advisor, Department:** Danielle Nadorff, Psychology**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: Attachment theory is defined as the relationships and bonds between people, particularly focused on those between a parent and a child (Ainsworth & Bell, 1970). According to Ainsworth, there are three main types of attachment styles: secure attachment, insecure avoidant attachment, and insecure ambivalent attachment (Ainsworth & Bell, 1970). According to Baumrind, parenting style is the pattern of normal variations in parents' attempts to control and socialize their children (Baumrind, Diana 1991). It represents the overall approach to child rearing rather than situation-specific practices by parents. The most commonly identified styles of parenting are authoritarian, permissive, and authoritative. The purpose of the current study is to examine the effect of parenting style on the attachment levels of both custodial grandchildren and foster children. Participants were recruited using Qualtrics Panel Service, which utilizes a double-opt-in and identify verification process, and also screens demographic information, to ensure that the correct group of participants are targeted. 399 grandparents raising grandchildren (called custodial grandparents) and 172 foster parents were included within the sample. As attachment is largely established within the first six months of life (Poehlmann, 2003), it was hypothesized that custodial grandchildren would have higher levels of secure attachment than foster children, due to the continuity of their relationship with their grandparent. Independent samples t-tests were conducted to test this hypothesis, and found that custodial grandchildren did indeed have more securely attached relationships with their grandparents than foster children. Implications and future directions are discussed.

BSE-08**Name, Major:** Kaylyn Cade, Food Science & Technology**Project Name:** *Effect of Couch to 5K program on lung function and body composition of healthy, sedentary adults***Faculty Advisor, Department:** Brent Fountain; Food Science, Nutrition, and Health Promotion**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Background: Couch to 5K (Ct5K) programs are designed to increase physical activity in sedentary individuals by gradually increasing activity during several weeks of training. The purpose of this study was to assess the effect of a popular 9-week Ct5K (3.1 miles) on body composition and pulmonary function of a healthy, sedentary adult population. Methods: Eighteen healthy, non-smoking adult participants (female (n=14); male (n=4)) 20-53 years old were screened for pre-existing health conditions and agreed to pre- and post-measurements. Pre- and post-measurements of lung function were measured by spirometry. Body Composition was assessed using air displacement plethysmography. Training logs and a gift (\$20.00 value) were provided to participants. Results: 73% of participants completed 100% of the 27 desired training activities. 11% completed 75-99% of the activities and 16% completed less than 75% of the activities. No difference was observed between pre-body mass and post-body mass of the participants (74.38±17.40kg vs. 74.07±17.94kg; P>0.05). A statistical difference was noted when comparing pre-bodyfat percentage and post-bodyfat percentage of all participants (33.8%±9.1% vs. 32.3%±8.9%; P<0.05). When comparing bodyfat change by sex, the female participants had a statistically significant difference (35.6%±8.7% vs. 33.6%±8.5%; P<0.05). Bodyfat changes in male participants were not statistically significant (27.9%±9.1% vs. 27.5±10.2%, P>0.05). No significant differences in lung function were observed (P>0.05). Conclusion: No significant body mass changes were observed between pre- and post-body mass measurements (9w). However, in females, overall bodyfat percentage decreased and fat-free mass increased as a result of participation in the Ct5K training program. Similar results were not seen in males. No statistical difference was observed between pre- and post-lung function. Participation in Ct5K programs and training plans may increase weekly physical activity among sedentary adults and may also improve body composition in females. This study was funded by Mississippi State University College of Agriculture and Life Sciences.

PSE-04**Name, Major:** Ysolde Carreon, Mechanical Engineering**Project Name:** *Effects of Microstructural Inclusions of Polyether Ether Keton (PEEK) Polymer under Mean Strain Fatigue Test***Faculty Advisor, Department:** Nimi Shamsaei, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: The demand for polymers as structural materials has increased in the automobile and aerospace applications over the past years due to their many advantages. Properties such as light-weight durability (high strength-to-density ratio when compared to metallic materials), hydrolysis resistance, and high chemical and temperature resistance make polymers a desired material in engineering. Polymers used as structural components are typically subjected to cyclic loading throughout their service lifetime that leads to the degradation of the materials due to fatigue. The fatigue process in polymers typically involves a crack initiation and growth phase which is significantly affected by the shape, size, and location of inclusions within the material. In this study, a microstructural analysis on a semi-crystalline thermoplastic polyether ether ketone (PEEK) under uniaxial strain-controlled cyclic loading was performed. The fatigue tests were conducted at constant strain amplitudes ranging from 0.02 mm/mm to 0.04 mm/mm and at various mean strain values ($R = -1$, $R = 0$, $R = 0.2$, and $R = 0.25$) to obtain the materials cyclic deformation and fatigue behavior. The fracture surfaces of PEEK fatigue specimens were analyzed using a scanning electron microscope to investigate crack initiation sites and microstructural inclusions responsible for fatigue cracks. Results revealed diverse types of inclusion factors liable for the crack incubation including micro-particles and voids. The shape, size, and location of inclusion particles responsible for crack incubation are obtained. The effects of mean strain on microstructural inclusions involved in crack initiation and growth for PEEK specimens are observed and discussed.

SS-06**Name, Major:** Rachel Cato, Psychology**Project Name:** *Social Desirability Levels as a Predictor of Honor Ideology in Military Men***Faculty Advisor, Department:** Danielle Nadorff, Psychology**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Social desirability is defined as “the need to obtain approval by responding in a culturally appropriate and acceptable manner” (Marlowe & Crowne, 1960). People may assume that a high need for approval may predict outward displays of honoring traditional masculine prototypes. However, research has shown mixed findings. A study of fifty 13-14-year-old men in Britain provided empirical evidence that “laddishness” (i.e., masculinity) may serve as self-protection from the implications of being seen as feminine (Jackson, 2003). Likewise, research has found that failures of honor damage social and self-image (Gausel & Leach, 2011). The current study explored the connection between social desirability and honor ideologies of manhood. An online survey of 416 military personnel across the U.S. was conducted via Amazon Mechanical Turk. A linear regression analysis tested the hypothesis that social desirability (measured by the Marlowe-Crowne Social Desirability Scale) was significantly associated with honor ideology (measured by the Honor Ideology of Manhood scale) after controlling for gender. Results demonstrated that higher social desirability significantly predicts lower scores of honor ideology in men, $\beta = -.352$, $t(414) = -3.32$, $p = .001$. This model accounted for a significant proportion of the variance in honor ideologies, $R^2 = .12$, $F(2,414) = 11.00$, $p < .001$. This research provides a way of understanding tendencies of individuals, despite their need for social desirability, to avoid opportunities to achieve. Better understanding this paradox may inform policies and practices that can encourage achievement behaviors in people (especially school-aged children) who appear confined to mediocrity by their social attitudes.

PSE-05**Name, Major:** Cole Cauthen, Mechanical Engineering**Project Name:** *Effect of Grain Aspect Ratio on the Fatigue Behavior of a Wrought Magnesium Alloy***Faculty Advisor, Department:** Nima Shamsaei, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: In this study, the effect of grain aspect ratio on the total fatigue life and crack incubation of a rolled AZ31 magnesium will be analyzed and modeled. As magnesium alloys have been considered by many industries to reduce weight in structural applications, mostly under cyclic loading, understanding the fatigue behavior of magnesium is of particular interest. Different grain aspect ratios have been shown to alter the amount of deformation twinning that occurs in a magnesium alloy under cyclic loading. To achieve this goal, cylindrical dog bone specimens will be cut out of the rolled plate such that half of the specimens will have fatigue loading take place in the rolling direction of the plate and the other half will have fatigue loading take place in transverse direction of the plate. The fatigue testing will be fully-reversed strain controlled with strain amplitudes ranging from 0.2% to 0.6%. After failure, the fracture surfaces of the specimens will be analyzed using optical and scanning electron microscopy to find the mechanism of crack incubation. The results of the strain controlled fatigue test will be used to calibrate a microstructurally sensitive fatigue model. The model will take into account the differences in grain morphology between the two orientations and will be able to accurately predict fatigue lives based on the difference in grain aspect ratio. The results of the experimental tests, fractography, and model predictions will then be discussed.

BSE-09**Name, Major:** Aung Chan, Wildlife & Fisheries Science**Project Name:** *Estimating the resident time of Tennessee Warblers, (*Oreothlypis peregrina*), in one of the stopover sites, Whigg Meadow, Tennessee: Stable Isotope Analysis***Faculty Advisor, Department:** Scott Rush; Wildlife, Fisheries, & Aquaculture**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Inland stopover sites provide critical resources for Neotropical songbirds during migration. Included among these songbirds in the Tennessee Warbler (*Oreothlypis peregrina*), a species that migrates from breeding grounds in the boreal forests to overwinter in Central and South America. To learn more about Tennessee Warblers use of a high elevation stopover site, we investigated the residence time of birds at one stopover site, Whigg Meadow, Tennessee. To determine residence time of Tennessee Warblers at this site, we applied mark-recapture models and stable isotope analysis ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$). We collected blood samples from 30 Tennessee Warblers captured in mist nets over a week period in 2015. Vegetation samples were collected from three dominant vegetation types (*Vaccinium*, *Crataegus*, and *Rubus* spp.). Both $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ were compared among Tennessee Warbler blood samples and dominant vegetation. Mark-recapture models applied to data collected from 2009–2014 indicated maximum stopover time of 14 days (mean = 5 days). When diet-tissue discrimination (trophic fractionation) and turnover rates were taken into consideration, we concluded that 60% of birds sampled in 2015 had been at the stopover site for 5–11 days by the time of capture, thus corroborating evidence from mark-recapture models. This study provides additional information that the conservation of inland stopover sites, such as Whigg Meadow, is a crucial conservation strategy for migrant songbirds.

BSE-10**Name, Major:** Matthew Christiansen, Wildlife & Fisheries Science**Project Name:** *Habitat Site Selection of Bachman's Sparrow***Faculty Advisor, Department:** Scott Rush; Wildlife, Fisheries, and Aquaculture**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Open pine systems were once a common habitat type in the southeastern United States. Suppression of fire by humans has been a major cause in the decrease in spatial coverage of this habitat type. For what pine habitat remains, increased understory thickness has limited suitability to many endemic species. Bachman's sparrow (*Peucaea aestivalis*) is a species of sparrow endemic to open pine systems. Despite much research on Bachman's Sparrows™ use of open pine, we know little about this species use of understory gaps, particular the size of these areas. To address this need, during 2015 from May 15 through July 1, we surveyed 33 pine stands on Noxubee National Wildlife Refuge for Bachman's Sparrow. We surveyed each site three times with approximately one week between surveys. Following these surveys, we collected vegetation metrics of tree height, diameter at breast height (DBH), understory and mid-story density, litter and duff depth, tree species composition and understory length-width measurements for each surveyed stand. . We found that Bachman's sparrow was most likely to be found in larger habitat sites with less understory density below one meter. This information points to the conclusion that larger expanses of open pine maintained through prescribed burning is essential to Bachman's Sparrow conservation.

BSE-11**Name, Major:** Jackson Coole, Biological Engineering**Project Name:** *Persistent Organic Pollutants Increase RAGE Signaling and Oxidative Stress in Diabetic Hearts***Faculty Advisor, Department:** James Stewart, Biological Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Consuming environmental contaminants with a high, saturated fatty diet has been demonstrated to promote precursors for metabolic syndrome (hyperglycemia, hyperinsulinemia, and hypertriglyceridemia). The purpose of this study was to determine if exposure to the most prevalent environmental persistent organic pollutants (POPs) would act as causative agents to promote metabolic syndrome independent of dietary intake. We hypothesized that AGE/RAGE signaling cascade will activate downstream signaling modulators to promote cardiovascular remodeling and oxidative stress in the heart. At 5-weeks of age nondiabetic (Wt) and diabetic (ob/ob) mice were exposed to sham or POPs mixtures through oral gavage twice a week for 6-weeks. At the end of 6-weeks, animals were sacrificed and the hearts were taken for biochemical analysis. Increased activation of the AGE/RAGE signaling cascade resulted in elevated levels of downstream markers for fibroblast differentiation, RAGE, and oxidative stress. POPs treatment increased protein levels of AGE/RAGE signaling outcomes in the diabetic animals. Conversely, ob/ob-POPs groups had decreased superoxide dismutase-1 and -2 (SOD-1 and SOD-2) expression than other groups. Reduction in SOD-1 and SOD-2 protein expression could exacerbate the adverse changes occurring as a result of POPs treatment, whereas in non-diabetic, cardioprotective mechanisms are primed (increased SOD-1 and -2 protein levels) to offset oxidative and inflammatory stressors allowing for POPs treatment to have less of an impact on the heart.

BSE-T04**Name, Major:** Folly Crawford, Biological Engineering**Project Name:** *In Silico Molecular Dynamics of Neuron Membrane Stress and Failure due to Mechanical Insult***Faculty Advisor, Department:** Raj Prabhu, Agricultural and Biological Engineering**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Traumatic brain injury (TBI) accounts for over two million emergency room visits and thousands of deaths every year in the United States. TBI is most commonly caused by falls, but can also occur during contact sports, car accidents, and occupation. Understanding brain structure and function and how they are altered by TBI is imperative for developing treatments. Brain structure can be viewed through a multi-scale paradigm in which each scale of the brain, all the way down to the molecular and atomic levels, is modeled and considered. Molecular dynamics (MD) can be used to model the neuron phospholipid bilayer membrane and to simulate stress and failure of the membrane. When a significant shear stress is applied to the membrane, pores form and can lead to cell death. MD models will be used to simulate shear stress applied to a 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (POPC) membrane and its effect on pore formation.

PSE-06**Name, Major:** Christopher Cullum, Industrial Engineering**Project Name:** *Stochastic Programming Solution for Satellite Ground Station Placement***Faculty Advisor, Department:** Hugh Medal, Industrial & Systems Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Natural disasters are amongst some of the most devastating and unexpected occurrences to affect a community. Data acquisition therefore becomes greatly beneficial in the bolstering of disaster recovery efforts at the ground level. One tool that accomplishes this is the collection of data received from orbital satellites by way of strategically placed ground stations. A major challenge with this tool is the reality that a ground station must be established before the disaster occurs. It is difficult to determine optimal location of these stations, given budgetary limits and various proximity factors. A stochastic programming approach to address this challenge is one of a handful of pathways that can be followed to help ensure that the maximum amount of data is being received. Realistic scenarios that utilize past historical data of east and west coast hurricanes, wildfires, and earthquakes are used to present results that come from implementing this approach. The scope of the data for wildfires and earthquakes are also confined to the United States and its territories alone.

PSE-07**Name, Major:** Cristiano da Costa, Civil Engineering**Project Name:** *Water Quality Assessment in the Catalpa Creek, MS***Faculty Advisor, Department:** John J Ramirez Avila, Civil & Environmental Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: A monitoring work has been performed to determine spatial and temporal variations of water quality parameters along the Catalpa Creek in Mississippi. Information regarding water temperature, salinity, turbidity, and dissolved oxygen has been collected in a bi-weekly frequency. Data analysis will help to identify external factors to the stream (e.g. rainfall events) affecting the quality of the water along the 4.1 main stream miles monitored within the Mississippi State University's main campus and South Farm boundaries.

SS-07**Name, Major:** Shelbie Dalton, Agricultural Information Science**Project Name:** *Investigating CALS faculty Knowledge and Perceptions of Social, Behavioral, and Educational Research and SoTL***Faculty Advisor, Department:** Gaea Hock, Agricultural Information Science**Project Type:** Poster**Project Category:** Social Sciences

Abstract: The ability to conduct, write, and publish social, behavioral, and educational (SBE) research is a vital aspect of the education profession, but sometimes lacks value in the higher education system. Educators must understand the importance of sharing teaching methods and learning from each other to continue to improve the efficiency of teaching ever-changing curriculum. The scholarship of teaching and learning (SoTL) is scholarly inquiry into student learning which advances the practice of teaching by making inquiry findings public. Survey research was conducted in an effort to measure College of Agriculture and Life Sciences (CALs) faculty's knowledge and confidence of conducting, writing, and publishing SBE and SoTL research. The survey was researcher-created and contained three sections. The sections consisted of demographic, institutional review board (IRB), and SoTL questions. The survey was emailed to the CALs faculty via a third-party list serve. There were 49 respondents with 67% ($n = 32$) males, 41% ($n = 20$) assistant professors, and each of the nine departments represented. The second section of the instrument assessed knowledge and perceptions of the institutional review board process. Thirty-five (74%) participants indicated they would conduct social, behavioral, and educational research at least every other year if they were informed about the IRB process. The third section of the instrument assessed respondents' knowledge and perceptions of SoTL. Almost two-thirds (60%, $n = 25$) of respondents had never previously conducted SoTL research, but the same number reported an interest in attending a workshop about how to conduct SoTL research. There were open-ended questions asked and several CALs faculty indicated SoTL is research that benefits students' education and improves pedagogical methods. It is recommended more clarification of the IRB approval process in regards to SBE research be practiced. Also, CALs should emphasize and promote SoTL in an effort to enhance teaching and learning across the college.

BSE-12**Name, Major:** Savana Davis, Agronomy**Project Name:** *Evaluation of Cotton Growth and Yield in Response to Furrow Irrigation Pattern***Faculty Advisor, Department:** Darrin Dodds, Plant and Soil Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Agricultural irrigation practices constitute a large percentage of groundwater usage across the Mid-South. Officials from the Yazoo Mississippi Delta Joint Water Management District (YMD) have been monitoring the aquifer in Mississippi and have seen an overall decline in groundwater levels over the past 30 years. In addition questions have arisen regarding every furrow versus alternate furrow irrigation on soils that often seal after an irrigation or rainfall event. Therefore, an experiment was conducted to evaluate cotton growth and yield in response to furrow irrigation patterns. This experiment was conducted at Bush Farms in Money, MS in 2015. Two furrow irrigation patterns were implemented in this study; one being every furrow and the other being alternate furrow irrigation. Cotton in which every furrow was irrigated produced significantly greater yields when mechanically harvested compared to cotton in which alternate furrows were irrigated. Data collected from box mapping showed that cotton in which alternate furrows were irrigated yielded similar to cotton in which every furrow was irrigated. Inconsistencies in yield response could be attributed to a variety of factors. Nodes five through eight on cotton in which every furrow was irrigated held a higher percentage of the weight when compared to alternate furrow irrigation. However, on nodes nine through 12 as well as 13 and above, irrigation pattern had no effect on percent of total weight located in each zone. Lint was also pulled from all cracked bolls when box mapping, including immature bolls which would not have been harvested by the picker due to the spindles inability to secure lint. Although cotton in which every furrow was irrigated significantly produced higher yields when machine harvested, approximately 50% more water was used compared to alternate furrow irrigation. Based on these data, alternate furrow irrigation is recommended.

BSE-13

Name, Major: Jacob Dix, Animal & Dairy Science

Project Name: *Duration of progesterone exposure and its effects on circulating concentrations of steroid hormones and activities of hepatic steroid-catabolizing enzymes in beef cattle*

Faculty Advisor, Department: Jamie Larson, Animal & Dairy Sciences

Project Type: Poster

Project Category: Biological Sciences and Engineering

Abstract: The aim of this study was to investigate circulating concentrations of progesterone and estradiol as well as activities of hepatic steroid inactivating enzymes at 2 time points during the estrous cycle in beef cattle. Thirteen primiparous heifers and 12 multiparous cows were randomly assigned to 1 of 2 treatments: 1) short duration of exposure to progesterone (SDPE; n=13), or 2) long duration of exposure to progesterone (LDPE; n=12). Blood samples were collected for analysis of concentrations of progesterone and estradiol, and liver samples were collected for analysis of enzymes that catabolize steroid hormones. Data were analyzed via the MIXED procedure of SAS; LSMeans and SE are reported. Decreased ($P = 0.01$) concentrations of progesterone were found in SDPE-treated cattle compared to LDPE-treated cattle (3.63 ± 0.80 and 7.12 ± 0.83 ng/mL, respectively). There was a tendency ($P = 0.08$) for concentrations of estradiol to differ between SDPE-treated cattle and LDPE-treated cattle (82.72 ± 6.48 and 65.55 ± 6.74 pg/mL, respectively). Females in the SDPE group had decreased ($P = 0.01$) activity of CYP1A compared to females in the LDPE group (0.68 ± 0.08 and 0.96 ± 0.06 RLU/min*mg of protein x106, respectively); but no other differences in enzymes were detected between treatment groups. Lesser ($P = 0.05$) concentrations of estradiol were observed in cows (64.54 ± 6.74 pg/mL) compared to heifers (83.73 ± 6.48 pg/mL). Differences were also observed in activities of UGT (0.52 ± 0.06 vs. 0.74 ± 0.04 RLU/min*mg of protein x106; $P = 0.003$) and CYP3A (1.67 ± 0.37 vs. 2.98 ± 0.37 RLU/min*mg of protein x106; $P = 0.01$) in heifers and cows, respectively. Therefore, increased concentrations of progesterone may not be the result of downregulation of hepatic progesterone catabolic enzymes; however, additional research is necessary to fully understand this relationship.

PSE-08

Name, Major: Jonathan Dowell, Mechanical Engineering

Project Name: *Smart Building Wireless Sensor Network*

Faculty Advisor, Department: Jeegin Cho, Mechanical Engineering

Project Type: Poster

Project Category: Physical Sciences and Engineering

Abstract: This research focuses on developing a wireless sensor network (WSN) solution that can be utilized to transform a conventional building into a smart building with an intelligent energy management system. Smart building technologies (a.k.a., intelligent building technologies) become a vital component to transform communities and cities to make them energy-efficient and environmentally-friendly, and an effective information communication tool would be a required feature to enable the smart and intelligent operations of buildings. In this project, wireless sensors and a communication network are currently being developed and implemented in campus buildings to measure and analyze building energy and performance data, including electricity consumptions of lighting, plugin, and HVAC, indoor and outdoor environmental conditions (temperature, relative humidity, light intensity and CO₂), occupant information, etc. A literature survey is currently being performed to understand the building physics and energy components and to identify key measurements that are required to enable smart building technologies. Various wireless sensors and a communication networks are currently being developed using open-source computer hardware and software (i.e., Arduino). The key features of the proposed WSN include a low build cost and a plug-and-play capability (i.e., an easy integration into a building energy management system). Data collection and uncertainty analysis are currently being performed to determine the feasibility and reliability of data for enabling the smart building technologies. My roles and responsibilities for this project consist of collecting and analyzing information on key variables to ensuring accurate data analysis. This includes gathering energy and performance data for electricity consumptions (lighting, plugin, and HVAC) and collecting data for environmental conditions (temperature, relative humidity, light intensity, and CO₂). I am also responsible for the uncertainty analysis of the collected data to assure that all results are accurate and precise.

SS-08**Name, Major:** Jessica Doyle, Educational Psychology**Project Name:** *The Effects of Anxiety on Academics: What Is the Relationship and What Can Be Done?***Faculty Advisor, Department:** Kasia Gallo; Counseling, Educational Psychology, and Foundations**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Because of a suspected rise in student trait and test anxiety, a literature review of fifteen empirical research reports was conducted to note trends in test anxiety and possible harmful effects on academic performance. The majority of reviewed studies reported a negative association between anxiety levels and performance, in respect to pre and post testing. Several authors also noted a variety of factors influencing levels of test anxiety. These variables included: domain contingent self-efficacy, particularly in math courses; perceptions of ones own anxiety; and implications of tests. Two studies found gender differences in self-efficacy for specific domains within standardized tests. Two others failed to find significant relationships between test anxiety and later academic performance, confirming a need for further research. Additionally, a very small number of longitudinal studies explored the impact which test anxiety may have on students long-term performance. Possible prevention methods are also suggested in order to promote research efforts of these variables as buffers to the negative effects of test anxiety. These include: intrinsic factors, perfectionism, calming and focusing techniques, and academic resilience. The data from the studies propose that high levels of test anxiety can be detrimental to students wellbeing, affecting attention, emotion regulation, and academic performance. These findings are alarming as the value placed on tests is only increasing with the frequency of high stakes testing. Therefore, a number of instances conducive to anxiety may be increasing rather than decreasing due to changes in education. The majority of reviewed research highlights and emphasizes the negative effects anxiety can have on performance; future research should focus on ways to reverse the test anxiety and to alleviate its effects. Keywords: test anxiety, academic performance, high-stakes testing, trait anxiety

AH- 07*****Name, Major:** Christine Dunn**Project Name:** *A Shake Truce: Starkville Civil Rights***Faculty Advisor, Department:** Judith Ridner, History**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: This project sought to identify key terms and themes present in interviews of members of the Starkville community present during the integration of education. These interviews were conducted by researcher's part of the "A Shaky Truce" project. In order to identify these terms and themes, the researcher listened to, partially transcribed, and annotated several key interviews. Using these partial transcriptions and annotations, as well as the notes taken by other researchers in the project, the researcher identified events and themes that appeared in multiple interviews. Once these themes had been identified, the researcher created lesson plans for the Starkville Civil Rights website, highlighting illustrative interview segments for teacher's use in the secondary education classroom.

BSE-14**Name, Major:** Luke Dunaway, Biological Engineering**Project Name:** *Characterization of Alginate-fibrin Micro-Bead Degradation for Cell Delivery***Faculty Advisor, Department:** LaShan Simpson, Agricultural & Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Cardiovascular disease is the leading cause of death in the United States. Recently, research has shown that the process in which the arteries calcify is similar to the biomineralization process of bone. Many treatments currently under investigation to treat vascular calcification involve the systemic administration of calcification inhibiting molecules that commonly lead to side effects. Given the fact that vascular calcification is similar to bone mineralization, we are examining the possibility of regulating vascular calcification via the same mechanisms that regulate bone mineralization. Osteoclasts are cells native to bone and are responsible for the breakdown of bone matrix. While there has been some investigation into the use of these cells to demineralize calcified arteries, to our knowledge the use of injectable biomaterials to deliver osteoclasts has never been investigated. Our research group's goal is to develop a method of delivering osteoclast cells to calcified arteries in order to treat vascular calcification. This experiment evaluates the microbeads use as a cell delivery vehicle. The microbeads are composed of 7.5% oxidized alginate with fibrin added at a concentration of 0.1%. The microbeads are cross-linked in a solution of calcium chloride and thrombin. This study evaluates the microbeads based on degradation and cell release.

BSE-15**Name, Major:** Rebecca Durr, Educational Psychology**Project Name:** *Intervention Strategies to Facilitate Oral Feedings in Preterm Infants***Faculty Advisor, Department:** Kasia Gallo, Educational Psychology**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Approximately 10% of infants in the United States are born prematurely. These infants face many developmental obstacles, including mastering the suck-swallow-breathe synchrony for oral feedings. This paper synthesizes fifteen empirical studies implementing intervention strategies to facilitate the preterm infant's transition from gavage feeding to oral feeding and discusses the effects of oral stimulation, nonnutritive sucking, and infant directed feeding programs on the infant's advancement to full oral feedings. Oral stimulation programs are administered once a day and include 12 minutes of stroking the infant's oral area, and then the infant sucks on a pacifier for 3 minutes. Researchers speculate that oral stimulation is effective because stimulation of the oral muscles strengthens them and leads to more coordinated sucking patterns. Nonnutritive sucking is defined as sucking when no nutrient is involved. Allowing preterm infants to engage in nonnutritive sucking through the use of a pacifier allows preterm infants to strengthen their suck muscles and practice coordination of suck-swallow-breathe synchrony. The final intervention strategy studied was the infant directed feeding program. This is defined as evaluating infant behavior cues for the advancement of oral feeding. Infant directed feeding programs which focus on quality-driven feedings help preterm infants attain full oral feedings earlier and at their own pace. The most effective intervention strategies involved combining stimulation with nonnutritive sucking. Within the literature of infant directed feeding programs, the SOFFI method demonstrated the least amount of transition time from tube feedings to oral feedings. The findings of this research are important for the doctors, nurses, and parents of preterm infants in the Neonatal Intensive Care Unit. These intervention strategies support the infant during the transition from tube feedings to oral feedings. Achieving full oral feedings allows the infant to gain weight and meet developmental milestones more quickly than infants on tube feedings.

BSE-16**Name, Major:** Alexis England, Biochemistry**Project Name:** *An insight into the salivary gland transcriptome of Lygus lineolaris—clues to insect-plant interactions***Faculty Advisor, Department:** Natraj Krishnam, Biochemistry & Entomology**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: The tarnished plant bug (TPB), *Lygus lineolaris*, is a major phytophagous and polyphagous pest insect that feeds on over half of the United State's commercial plants such as cotton, alfalfa, and vegetable crops. It employs a "lacerate and flush" feeding strategy by injecting saliva through its mouth parts into the plant tissues to solubilize the cellular contents for ingestion. In order to degrade the cellular contents, the saliva is known to contain relevant enzymes such as polygalacturonases. The transcriptome of the salivary gland of TPB was explored using Illumina sequencing to reveal other components of the saliva. Following in silico RNA translation, 25,767 putative proteins were discovered. Of these, over 19,000 matched with known proteins in either the National Center for Biotechnology Information (NCBI) or Universal Protein Resource (Uniprot) databases. The effectors, especially GOX and regucalcin, involved in the insect plant interactions have been presented.

PSE-09**Name, Major:** Nicholas Ezzell, Physics**Project Name:** *Modeling Intrinsically Disordered Proteins with Chemically Realistic Monte-Carlo Simulations***Faculty Advisor, Department:** Nick Fitzkee, Chemistry**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Though it was once believed that protein function was inextricably linked to a definite three-dimensional structure, this paradigm has come under scrutiny as our understanding of intrinsically disordered proteins (IDPs) has improved. Given the importance that IDPs play, wherein molecular binding to globular protein domains can induce significant alterations in IDP structure, relevant and accurate simulations must be produced to understand the role of IDPs in biological mechanisms. Previously, we implemented a Monte Carlo simulation for generating chemically realistic, disordered protein conformations, but this model lacked rigorous conformational sampling of protein side chains and cis-trans proline isomers; instead, only phi and psi torsion angles were adjusted in simulations. Here, we have implemented side chain chi angle randomization, which provides improved chemical realism in structure generation. Torsion angles are selected using a library of frequently used side chain rotamers found in the Protein Data Bank (PDB). To ensure that structural snapshots are sufficiently independent, we have investigated the degree of torsion angle randomization with an autocorrelation analysis. We find that introducing side chains reduces the efficiency of generating structures as measured by the acceptance rate, but that average chain dimensions are not affected by the change. Future work will focus on introducing prolyl isomerization into the simulation. A long-term goal is to accurately model the protein conformations of the N-terminus of the p53 protein, an intrinsically disordered protein region involved in cell cycle control.

PSE-10**Name, Major:** Emily Farrar, Civil Engineering**Project Name:** *Soil Organic Carbon Sensitivity in the Sacramento-San Joaquin Delta***Faculty Advisor, Department:** Farshid Vahedifard, Civil & Environmental Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Geotechnical infrastructure, such as dams and levees, are used extensively for flood protection and transport. The predicted effects of climate change (rising sea levels, increased temperatures, and increased extreme weather events) are expected to create additional environmental stress upon geotechnical infrastructure. In order to ensure sustainability when maintaining or building new infrastructure, it is important to take into consideration future climatic scenarios. This research project utilizes an existing big-microsite framework, or the Dual Arrhenius Michaelis-Menten model, in order to investigate the multi-hazard scenarios of the concurrent effects of climatic trends on soil organic carbon decomposition in the Sacramento-San Joaquin Delta of California. An area rich in highly organic mineral soils, the delta is extremely susceptible to subsidence, which threatens infrastructure and water supply for the region; a recent study estimates that the primary cause of delta subsidence is the oxidation of organic deposits. This research will model the sensitivity of decomposition rates of soil organic matter in the Sacramento-San Joaquin delta with respect to simultaneous changes in temperature and moisture, two factors that are altered simultaneously with climate change.

BSE-T05**Name, Major:** John Laws Ferguson, Biological Engineering**Project Name:** *Male giant panda volatile profile response to female estrus urine***Faculty Advisor, Department:** Darrell Sparks; Biochemistry, Molecular Biology, Entomology, Plant Pathology**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Giant pandas (*Ailuropoda melanoleuca*) are solitary animals that are dependent upon chemical communication for identification of conspecifics, estrus status, and sexual receptivity. Female giant pandas have one estrus cycle that typically occurs in the spring breeding season; during this time, the window of fertility is only 1 to 3 days. Male giant pandas use chemical cues left by females to determine when the female is sexually receptive. Possible sex pheromones in female urine may be initiating the courtship process by eliciting a physiological response in male giant pandas. Analysis of chemical cues excreted by male giant pandas in response to specific days of female estrus urine will determine if estrus urine elicits a physiological response. We hypothesize that estrus urine two days prior to ovulation will elicit a change in the chemical compounds excreted in male giant panda urine because this is likely when the female is at peak sexual receptivity. Male giant pandas housed at Toronto Zoo, Zoo Atlanta, Memphis Zoo, and San Diego Zoo were exposed to specific days of estrus urine from unknown female giant pandas through a series of behavior trials during the breeding (n=4) and non-breeding seasons (n=3). Urine was collected one week prior, during, and one week after the behavior trials. Urinary volatile compounds were extracted using a solid phase micro-extraction fiber and analyzed through gas chromatography mass spectrometry. Compounds that occurred in a high proportion (>10% in urine and >65% of subjects) during pre and post trial collection established the baseline volatile profile. An increase in the relative abundance of particular baseline compounds in response to specific days of estrus urine may suggest which chemical cues male giant pandas use for chemical communication. Identification of these compounds may result in a substantial impact on management and reproduction in captive breeding programs.

BSE-T06**Name, Major:** Lucas Ferguson, Biochemistry**Project Name:** *Pathogenesis of Influenza D virus in Cattle***Faculty Advisor, Department:** Henry Wan, Veterinary Medicine**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Cattle have been proposed as the natural reservoir of a novel member of the Orthomyxoviridae virus family which has been tentatively classified as influenza D virus (IDV). Although isolated from sick animals, it is unclear if IDV causes any clinical disease in cattle. To address this aspect of Koch's postulates, three dairy calves (treatment animals) held in individual pens were inoculated intranasally with D/bovine/Mississippi/C00046N/2014, and paired with a naive calf (contact animals) at 1 day post inoculation. The cattle in both treatment and contact groups seroconverted and virus was detected in their respiratory tracks. While treatment and contact animals demonstrated various symptoms of respiratory infection, calves in the treatment group did not differ from controls in terms of heart rate, respiratory rate or rectal temperature. Although the disease observed was mild, IDV induced significant neutrophil tracking and epithelial attenuation in treatment calves as compared to control animals, which could facilitate co-infection of other pathogens and in doing so, predispose animals to bovine respiratory disease. To mimic zoonotic transmission, two ferrets were exposed to a plastic toy fomite soaked with infected nasal discharge from the treatment calves. These ferrets neither shed the virus nor seroconverted. In summary, this study demonstrates that IDV causes a mild respiratory disease upon experimental infection of cattle and can be transmitted among cattle by in-pen contact, but not from cattle to ferrets through fomite exposure. These findings support the hypothesis that cattle are a natural reservoir for this virus.

BSE-17**Name, Major:** Sarah Fitzgerald, Biological Engineering**Project Name:** *Biomechanics of the Optic Nerve***Faculty Advisor, Department:** Jun Liao, Agricultural and Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: While outside of Earth's atmosphere, astronauts experience several physical abnormalities due to microgravity. Some of these include intraorbital and intracranial pressure changes similar to the effects of idiopathic intracranial hypertension. These abnormalities may result in blurred vision that can ultimately lead to permanent blindness. It is believed that the optic nerve may be an integral part of both the cause and the solution to preventing or treating this affliction. Though there have been several studies done concerning the correlation between intracranial pressure and the optic nerve, to the best of our knowledge there is no study that investigates the biomechanical properties of the nerve itself. The same is true of the sheath that surrounds it. When exposed to microgravity, many astronauts experience an enlarging of the optic nerve and result in buckling of the optic nerve sheath, though the actual cause of the affliction remains unknown. It is our aim to test the limits of the optic nerve, and the surrounding sheath, to gain a better understanding as to why it may fail, whether it is due to pressure changes or buckling of the nerve. To gain a better understanding of the material is to gain a better understanding of the affliction that plagues these astronauts, and to the prevention and treatment of it.

BSE-T07**Name, Major:** Tate Fonville, Mechanical Engineering**Project Name:** *A Safer Football Helmet***Faculty Advisor, Department:** Mark Horstemeyer, Mechanical Engineering**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: In order to reduce concussions in football, football helmets can be upgraded by simulation based design in order to quantify damage to the brain. Our simulations of how the brain is affected during a football game help us to approach helmet designs in a new way. Breaking down the helmet into the facemask, shell, and foam liner, we ran simulations to produce a unique and near optimal design. Material selections based on our simulations were then subjected to tension, compression, and thermal tests. A physical helmet model was constructed using these optimal materials, and NOCSAE impact tests were performed to compare our helmet model to others on the market. A 3D Computer Aided Drawing (CAD) model was developed from Computed Tomography (CT) scans of the physical model, so we could then modify and improve our helmet. Our test results indicate that our shell is stiff so that the energy absorbed during the hit translates the shock to the energy absorbing foam liner. The absorbing foam liner dissipates the energy through mechanical compression thus generating heat. Further tests and helmet developments hope to reveal an optimal helmet model that can be produced and put into the game providing fewer concussions and an overall safer game at every level.

BSE-T08**Name, Major:** Emerald Ford, Animal & Dairy Sciences**Project Name:** *Characterization of genes associated with antibacterial activity of Curtobacterium sp. strain MS163 against bacterial pathogen Erwinia amylovora***Faculty Advisor, Department:** Shien Lu, Biochemistry**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Characterization of genes associated with antibacterial activity of Curtobacterium sp. strain MS163 against bacterial pathogen Erwinia amylovora Emerald Ford, Sonya M. Baird, and Shi-En Lu Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology Development of novel antimicrobial compounds as biopesticides and pharmaceutical drugs is in demand due to resistance development of plant and human pathogens. Bacterial genes are important resources to explore new antimicrobials. Fire blight, caused by the bacterial pathogen Erwinia amylovora, is a destructive disease on pear and apple trees. Bacterial strain MS163, isolated from the rhizosphere of a healthy corn plant, exhibits significant antifungal activity against E. amylovora. Preliminary study indicated that strain MS163 belongs to the Gram positive bacteria Curtobacterium. Currently, no antimicrobial products that inhibit the growth of the bacteria not closely related have been identified from Curtobacterium spp. The objectives of this research are to identify the bacterial strain and characterize its antibacterial activity. The 16S rRNA gene of MS163 was PCR amplified, cloned and sequenced. Sequence analysis revealed that the 16S rRNA gene of MS163 shared the highest identities (99%) with strains of the genus Curtobacterium, suggesting that the strain belongs to this taxon. Phylogenetic analysis of the 16S rRNA sequences showed that MS163 was grouped with the strains of C. flaccumfaciens. However, PCR analysis using the primers specific to C. flaccumfaciens pv. flaccumfaciens showed that strain MS163 is not member of this pathovar. Further biochemical analysis using the API system suggests that MS163 may be a new pathovar or species of Curtobacterium. Plate bioassays showed that MS163 produced maximum antibacterial activity against E. amylovora on potato dextrose agar plates at Day 5. Mutagenesis to characterize the genes associated with production of antibacterial activity is underway. Findings of the study will provide insights to understanding molecular mechanism of antibacterial activity of MS163.

BSE-T09**Name, Major:** Ruth Fowler, Physics**Project Name:** *Effective Uses of Chitosan-Bonded Biochar as a Lead and Nutrient Adsorbent***Faculty Advisor, Department:** Todd Mlsna, Chemistry**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: As the production of biofuel has increased in recent years, a byproduct of the process, biochar, has garnered much interest. We have discovered that biochar's adsorption capabilities have the potential to significantly improve environmental issues facing the world today. One problem biochar can address is purifying drinking water from pollutants, such as heavy metals which are toxic to living organisms. Extensive research has determined biochar as an effective, metal adsorbent that can be a low cost alternative to current methods. The objective of this study is to maximize the biochar's adsorption ability by bonding chitin-derived chitosan to modify its surface and improve adsorption capacity. A primary environmental contaminant, lead, was chosen for this experiment. The procedure involved placing 0.05 grams of chitosan-bonded biochar into vials with Pb²⁺ solution to determine degree of adsorption. Optimal lead concentration, pH, temperature and time were determined throughout the study. The filtered solution was analyzed for metal uptake by using Atomic Absorption Spectrometer (AAS). Chitosan-bonded biochar was found to adsorb a much higher percentage of lead than non-modified biochar. Another environmental issue that biochar can address is farmland depletion and eutrophication. Annually, approximately half of fertilizers are lost via water runoff, into surrounding bodies of water. The nutrient loss in the runoff causes soil depletion, affects crop growth, and creates environmentally dangerous deadzones in oceans. This study's purpose is to use biochar as an adsorbent that is mixed into soil to retain fertilizers, making them available to the plant, thus preventing runoff and increasing crop growth. Soybean growth in biochar is currently being tested in a greenhouse study in a variety of soil to determine plant growth and soil nutrition levels. Early findings show smaller amounts of biochar are preferable to retain fertilizers, yet, to not compete too strongly with the plant for nutrients.

PSE-11**Name, Major:** Jack Francis, Industrial Engineering**Project Name:** *Approximation approach for an integrated facility-inventory allocation model in a disaster affected scenario***Faculty Advisor, Department:** Mohammad Marufuzzaman, Industrial Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Integrated facility location and inventory management in a disaster affected scenario is a novel approach that has never been studied before in literature. This research deals with this problem where the key decisions are where to locate the transportation centers, how to assign demand points at each transportation center, and what should be the inventory policy such that the total network cost is minimized. In each transportation center it is assumed that both trucks and drones are available and each of them can be used to serve the customer points with a certain probability. However, the resultant model becomes non-linear which is very challenging to solve. To solve this, Continuous Approximation (CA) approach is used. Coastal region of Mississippi is used as a test bed as this region is historically prone to natural disasters such as hurricanes and tornadoes. This research also studies the effects of changing parameter values on the optimal solution which provide many useful managerial insights.

AH-08**Name, Major:** Lauren Gamblin, Horticulture**Project Name:** *Soil Invertebrate Community Responses to Bark Beetle Outbreaks***Faculty Advisor, Department:** John Riggins, Biochemistry**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: Soil Invertebrate Community Responses to Bark Beetle Outbreaks Lauren L Gamblin¹, Natalie Dearing², Payton Jackson³, Natalie Clay⁴, and John J. Riggins³ ²Department of Forestry ³Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology, College of Agriculture and Life Sciences ⁴ Biological Sciences, Louisiana Tech University e Sciences Abstract Soil invertebrates can enhance nutrient cycling and productivity in forest ecosystems in a variety of ways: their consumption of detritus increases decomposition rates, their activity impacts CO₂ flux, and they are vital food sources for other animals. Despite their importance, few studies have quantified soil invertebrate community fluctuations following bark beetle disturbances in the southeastern USA. Our objective was to determine how soil invertebrate communities respond to pulses of nutrients created by simulated bark beetle outbreaks. Southern pine beetles (*Dendroctonus frontalis*) greatly impact forests in the southeastern USA by attacking and killing pine trees. They also act as a vector for blue stain fungus. We experimentally seeded 10 plots in a Mississippi forest with logs in the following treatments: 1) control (sterile water inoculated), 2) Simulated bark beetle (inoculated with bluestain fungus from southern pine beetle, 3) Caged control (to exclude subsequent insect attack, and 4) Caged simulated bark beetle. The purpose of the four different treatments was to identify whether or not the blue stain fungus, indicative of a bark beetle infestation, had any effect on the number and diversity of the invertebrate populations. These results could be helpful in understanding the overall effect of southern pie bark beetle, not just on pine populations, but in regards to overall forest health and nutrient cycles.

BSE-18**Name, Major:** Lisa Garrigues, Forestry (Wildlife Management)**Project Name:** *The Influence of Throughfall Partitioning on Forest Nutrient Dynamics***Faculty Advisor, Department:** Courtney Siegert, Forestry**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Throughfall is an important component of water cycling in forest environments, largely because it provides a flux of nutrients to the forest floor that can be readily reabsorbed for use by vegetation and soil organisms. Throughfall greatly influences microclimate conditions, yet very little data are available regarding the spatial variance of inputs in southeastern forests. Therefore, the objectives of this study were to: (1) assess the temporal volumetric and chemical variation in throughfall, (2) measure soil nutrient composition and respiration, and (3) determine the relationship between throughfall and soil properties in a north-central Mississippi temperate forest. Throughfall and precipitation samples were collected bi-weekly from October 2014 to present to quantify temporal and spatial trends in throughfall hydrologic and biogeochemical fluxes. Soil respiration measurements were taken monthly and soil cores were collected seasonally from the O (litter layer), A (0-5cm), and B (5-10cm) horizons to quantify C and N concentrations. Winter total precipitation was 80.5 cm with a mean throughfall of 80%. The summer leafed season had 9.7 cm of cumulative precipitation, with a mean throughfall of 58%. Data show that throughfall partitioning increased as a function of total precipitation, likely as a result of canopy saturation and overall intensity of precipitation events. Greater fluxes of dissolved organic carbon (DOC) occurred in throughfall during the initiation of the leafed season, likely from DOC leaching from young canopy leaves. Within soil horizons, the litter layer had the largest percentage of carbon, due to the composition of pine needles and hardwood leaves. With increasing depth in the soil profile, carbon and nitrogen content decreased. This trend indicates higher nutrient availability in the upper A horizon and organic soil layer. This study illustrates the seasonally driven variability of throughfall inputs in southeastern mixed-deciduous forests, and aids in our understanding of forest dynamics in changing climates.

AH-09 ***

Name, Major: Fleshia Gillon, Human Sciences (Apparel Textiles & Merchandising)

Project Name: *Sweet Potato Leather*

Faculty Advisors: Charles Freeman, Todd French, Jason Ward, Stephen Meyers

Project Type: Poster

Project Category: Arts and Humanities

Abstract: Technology we know is a forerunner of fashion. Just by stepping into a clothing store your whole style is created for you through technical concepts. We live in a world where technology meets fashion but what happens when science and fashion collide. Creativity is all around us and in learning and exploring creativity in the design process to come up with different ways to solve problems provided the foundation for this project. The purpose of this project was to use culled sweet potatoes and make a functional alternative end-use product. Using an innovative vegetable leather recipe, we converted the process to make a synthetic leather from sweet potato sucrose. In collaboration with Dr. Todd French, chemical engineering professor, we utilized chemical engineering labs and our ingredients to create our sweet potato leather. In order to grow this fabric, we needed 200 milliliters of organic cider vinegar, 200 grams of granulated sugar/sucrose, one live kombucha culture, 2 green tea bags. In this process, researchers boiled two liters of water, and steeped the tea for 15 minutes. After stirring in the sugar until it is dissolved, the vinegar and culture were added once the tea has cooled to 86 degrees and covered. After three to four weeks, the leather was rinsed, cleaned, and dried on cedar planks; leaving a strong, durable piece of leather. We modified the original method to switch out the 200 grams of sugar for extracted sweet potato sucrose with the help of Jason Ward and Stephen Meyers of the Agricultural and Biological Engineering department. Results indicate a successful modification and ingredient substitution from the original recipe, with similar quality and durability.

SS-09 ***

Name, Major: Jase Gonzalez, Interdisciplinary Studies

Project Name: *Kumara*

Faculty Advisor, Department: Charles Freeman, Human Sciences

Project Type: Poster

Project Category: Social Sciences

Abstract: Kumara is a product inspired by the intertwining of New Zealand and Mississippi's fine, home grown sweet potatoes. Kumara was created to fill the void missing in natural skin care lines currently on the market. Kumara's main objective is to appeal to all skin types and conditions and this product is unbiased towards age, as well as gender. Ultimately, Kumara is the skin care line that has been uniquely created specifically with the well-being, interest, and value for current individuals, families, and generations to come.

BSE-19**Name, Major:** William Griffin, Forestry**Project Name:** *The Impacts of Mammalian Herbivory on Upland Hardwood Forests***Faculty Advisor, Department:** Heather Alexander, Forestry**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Mammalian herbivory is an important element in the controlling of forest successional trajectories. For example, preferential browse on particular plant species can lead to an increase in the amount of less palatable species. The primary objective of this study was to evaluate how long-term (16+ years) exclusion of large mammalian herbivores affects the composition, abundance, and height of woody plants in the understory of mixed upland forests. We hypothesized that a decrease in browse intensity would lead to taller plants, more diverse species composition, and a greater abundance of plants. To test this hypothesis, we quantified browse intensity along six 30-m long line transects and surveyed woody plant size, density, and composition within six 10-m² plots in February of 2016, within a 5 acre enclosure established in 2000 and across a similarly-sized area outside the enclosure. Outside of the enclosure, 10 different species were recorded, 17.5 % of stems were browsed, an average of 1.46 stems/m² was recorded (avg of 58.5 stems/plot for 2 outside plots), and stems averaged 2.07 m in height. Within the enclosure, 7 different species were recorded, 16.2% of stems were browsed, an average of 1.5 stems/m² was recorded (avg of 60 stems/plot for 2 inside plots), and stems averaged 1.75 m in height. These findings suggest that mammalian herbivory impacts woody vegetation by increasing heights, and reducing species variability. Future work includes evaluating herbivore impacts on forest dynamics within hardwood bottomlands and southern pine.

PSE-12**Name, Major:** Shreya Gupta, Computer Science**Project Name:** *Object Recognition and Tracking via a Turtlebot***Faculty Advisor, Department:** Cindy Bethel, Computer Science & Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: This research project focused on identifying an object in a given area/map while moving through an environment, by using a Microsoft Kinect sensor, mounted on a Turtlebot (robot). The primary objective was for the robot to navigate through a mock apartment in the Robotic Testbed Facility at Center for Advanced Vehicular Systems (CAVS) and search for a moving object, for the purpose of this study, a small autonomously-operated BB8 robot. The first step was to have the Turtlebot robot teleoperated to search for the autonomous BB8 robot (was possible only in close range). The navigation and location were the initial steps in this research project. Following this step, the Turtlebot was programmed to follow the BB8 robot and track it in the environment. Using the Kinect sensor the Turtlebot was navigated through the apartment to locate the BB8 robot. After this was accomplished with teleoperation, the Turtlebot was programmed to be autonomous. Following this, test runs were carried out in the Social, Therapeutic, and Robotic Systems Laboratory (STaRS Laboratory) as well as the Testbed Facility at CAVS. The results will be presented in a poster along with pictures of different stages of the project. The project could be relevant to the SWAT Robotics team in the future, to identify suspects/hostages and alert the SWAT officers about its location. This research forms the foundation for the integration of robots with tactical (SWAT) teams to locate possible moving threats in the environment.

SS-10

Name, Major: Riley Hanby, Agricultural Information Science

Project Name: *Cattle Producers' Feed Preferences*

Faculty Advisor, Department: Laura Lemons, Human Sciences

Project Type: Poster

Project Category: Social Sciences

Abstract: This project came to light as a result of the Mississippi Sweet Potato Innovation Challenge. The purpose of the challenge is to have students find a use for culled sweet potatoes. One use developed is complete cattle feed with the main ingredient being sweet potatoes. The producers found it difficult to accept the idea of using a feed with sweet potatoes instead of corn so before development began we wanted to ensure that the demands of the producers was met. Studies are being released to help the producers know what to look for in feeds and how to make an economically wise choice with ease (Kunkle and Bates, 1998). However, there is very little information on what the producers actually look for. The purpose of this study was to determine what component producers place the most importance on when buying cattle feeds. The objective was to determine which of the five components; Protein, Ease of Feeding, Ingredients, Minerals or Average Daily Gain, was deemed most important by beef cattle producers and if the type of production, commercial stock, seed stock and show stock, influenced their decision in any way. The producers were given a survey where they were asked to fill in their type of production, number of head of cattle and to rank the five components in order from most to least important. We found that both commercial and breeding producers looked at the cost of the feed, while show stock producers focused more on the average daily gain. While there has been research on the feed preferences of cattle and what producers need to look for within a feed, there is very little research on what the farmers actually look for. Through these surveys we were able to determine the desires of the producers. This data be used as we move forward with our feed formulation to ensure that the producers priorities are met and our product will be marketable.

SS-11

Name, Major: Shaquela Hargrove, Psychology

Project Name: *The Ongoing Assault on LGB America: Implications of Homophobia, LGB Knowledge, and Persona Factors*

Faculty Advisor, Department: Kristina Hood, Psychology

Project Type: Poster

Project Category: Social Sciences

Abstract: Homophobia, or fear of homosexuality, perpetuates stigma against the LGB (Lesbian, Gay, Bisexual) community. Although 55% of people accept of LGB marriage, there is still room for progress (Changing Attitudes on Gay Marriage, 2015). Previous literature suggests that personal factors (e.g., ethnicity, religion, sexual orientation, and political affiliation) may be fundamental in understanding the relationship between homophobia and acceptance of LGB couples (Perry, 2013b). In the present study, we sought to determine which personal characteristics influenced LGB knowledge and homophobia. An online survey of 381 undergraduates included the Homophobia Scale and the LGB Knowledge and LGB Hate subscales from the LGB Knowledge and Attitudes Scale. Personal factors (political affiliation, sexual orientation, religion, ethnicity) were assessed using one question each. Two multiple hierarchical regression analyses were run. Results indicated that LGB knowledge was significantly influenced by political affiliation, $B=-.167$, $t(380) = -3.175$, $p=.002$, sexual orientation, $B=.176$, $t(380) = 3.517$, $p<.001$. Future research should evaluate why specific variables affect homophobia, LGB hate, and LGB knowledge. This research can inspire policy change and guide programs tailored to increase LGB knowledge and acceptance and promote positive societal change.

BSE-T10**Name, Major:** Amanda Harper, Biochemistry**Project Name:** *Microscopic analysis of Rickettsial co-infection in the Gulf Coast tick, Amblyomma maculatum***Faculty Advisor, Department:** Andrea Varela-Stoke, CVM Basic Sciences**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: The objective of this project was to understand the localization of two species of tick-associated intracellular bacteria (*Rickettsia parkeri* and “*Candidatus Rickettsia andeanae*”) in the tick, *Amblyomma maculatum*. *R. parkeri* is a spotted fever group rickettsia (SFGR) and classified as a human pathogen, while “*Ca. R. andeanae*,” also a member of the SFGR, has so not been proven to be so. It was hypothesized that *R. parkeri* may be “dominant” in tick tissues related to transmission over “*Ca. R. andeanae*”. We examined tick midgut, salivary gland, and ovary tissues, which all play an important role in vertical and horizontal rickettsial transmission. Tissue samples with the highest levels of rickettsiae as quantified by qPCR from among 15 pools of artificially-infected adult ticks, in four experimental groups, were prepared for both TEM (transmission electron microscopy) and fluorescence microscopy. For fluorescence detection, FISH (fluorescence in situ hybridization) was used for “*Ca. R. andeanae*” and IHC (immunohistochemistry) for the GFPuv-expressing *R. parkeri*. Thus far, preliminary TEM images revealed suspect rickettsiae in the midgut of positive ticks. The analysis of samples using FISH/IHC has so far shown that the protocol is effective via control samples, although few experimental samples have been identified as positive. At the conclusion of this study, we expect to have a better understanding of tissue tropism for each bacterium when present alone or co-infecting a tick, leading to a better understanding of transmission potential and rickettsial prevalence in tick populations, as well as potential risk to public health.

PSE-13**Name, Major:** Cristián Henry, Agricultural Engineering Technology & Business**Project Name:** *Phenol Formaldehyde Resin: Replacing Phenol with a Bio Based Resin-Lignin***Faculty Advisor, Department:** Mojgan Nejad, FWRC-Sustainable Bioproducts**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Phenol Formaldehyde Resin: Replacing Phenol with a Bio Based Resin-Lignin Authors: Christian Henry, Isal Kalami, and Morgan Nejad Affiliations: Mississippi State University Abstract: In order the replace phenol with lignin, the initial lignin must be isolated. Isolated lignin is achieved by dissolving the lignin mixture in basic solvent, sodium hydroxide, and later precipitating the liquid mixture with sulfuric acid. This process yields about 90-98% pure lignin. This isolated lignin can then be used to replace phenol in phenol formaldehyde resins. This process uses a 2.8g to 1g lignin to formaldehyde ratio. Sodium hydroxide is used to dissolve the lignin and the mixture is condensed with formaldehyde while being stirred at 300 revolutions per minute and heated. This condensed liquid is then cooled and mixed with distilled water, wheat flour, extender, and sodium hydroxide in order to create commercial phenolic grade resin. This resin preparation technique is more environmentally friendly than traditional techniques and could potentially replace conventional phenol formaldehyde resins.

SS-12

Name, Major: Anna Hodson, Human Sciences (Apparel Textiles & Merchandising)

Project Name: *Color Decisions*

Faculty Advisor, Department: Charles Freeman, Fashion Design & Merchandising

Project Type: Poster

Project Category: Social Sciences

Abstract: Colors can affect places we eat, the jobs we are interested in, even what we wear. It is important to understand the relationship between color and decision making. Wexner said that when discussing color and decision making, we do know that color has an effect on one's emotions (Valdez, 1994). The questions when beginning this research include how color subconsciously affects college students' clothing purchases and what exact colors influence students differently. The research objective will be to study college students and analyze the clothing decisions that are made and how the colors are influencing such decisions. The significance of the research could cause students to be aware of their surroundings and how to make clear decisions, and could also inspire changes in the colors found in clothing stores. The research concluded that color and aesthetic value is an automatic decision maker for customers (Chan, 2015). The basis of this study is influenced by the theory of association and the psychology of color theory. The association theory states that the connections between a stimulus and a desired response results in an association (Grossman, 1999). In relation to this study, when college students are choosing what clothing to wear, the color is the stimulus that connects to the response of what they choose. The study's independent variable is the students' perception of colors, and the dependent variable is the decisions that are made and the different clothing items that college student's purchase. There will be a qualitative survey for focus groups and they will include students within a variety of majors. Each focus group will receive questionnaires for each participant in the group. There will be generic questions for everyone to answer. The questions will become more specific to the participant throughout the survey.

PSE-14

Name, Major: Zachary Holman, Mechanical Engineering

Project Name: *Shape Memory Alloys: Analysis of Mechanical Properties of Nitinol*

Faculty Advisor, Department: Wilburn Whittington, Center for Advanced Vehicular Systems

Project Type: Poster

Project Category: Physical Sciences and Engineering

Abstract: Nitinol is a shape memory alloy composed of Nickel and Titanium. This material has two very unusual and unique qualities that allow the nitinol to retain and recover its shape even when it undergoes deformation. It demonstrates the shape memory effect (SME) and superelasticity (SE). SME and SE allow this composite to reform back into its original shape after being deformed then heated above its "transformation temperature". Because of nitinol's SME and SE traits the stress strain curve of this material is very special and it even mimics the stress strain curve of bone. This makes nitinol a promising material with which to make bone implants/grafts. In hopes of finding the closest match to bone, nitinol can be heat-treated and yield different results. Aaron Holman and Christina Hayden have preformed several tests with differently treated specimens to determine the heat treatment that causes nitinol to most closely resemble bone's reactions under certain conditions.

BSE-T11**Name, Major:** Andrew House, Biochemistry**Project Name:** *Investigating Environmental Effects on Physiological Responses in Alligator Gar***Faculty Advisor, Department:** Federico Hoffman, Biochemistry & Molecular Biology**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: The alligator gar (*Atractosteus spatula*) is a freshwater fish species distributed primarily in the Mississippi River drainage basin in the southern US. This species is able to tolerate a vast range of oxygen and salinity concentrations, and possesses an air breathing organ (ABO) facilitating air breathing in poorly oxygenated water. The breadth in environmental tolerances and use of an ABO allows for unique opportunities to link physiological changes to functional and evolutionary genomics by using the alligator gar as model species. The aim of this study was to investigate alligator gar coping mechanisms presented by environmental challenges of oxygen and salinity. To do so, physiological changes in blood were measured in fish exposed to different environmental conditions. Forty-eight juvenile gar were separated into one of four environmental treatments (normoxic freshwater, hypoxic freshwater, normoxic brackish water, and hypoxic brackish water) with four fish per tank, four tanks per treatment and sixteen tanks total. Fish were exposed to environmental conditions for 19 days and then blood was sampled. Blood was analyzed for protein, lactate, glucose, cortisol, hemoglobin, hematocrit, pH and osmolality. Results will be discussed in the context of fish health and conservation in river ecosystems. The long-term goal of this project is to link phenotypic changes to the genomic level in alligator gar.

AH-T01**Name, Major:** Leslie Howard, Psychology**Project Name:** *Is saccade-induced retrieval enhancement a potential means of decreasing the cross-race effect in eyewitness identification?***Faculty Advisor, Department:** Deborah Eakin, Psychology**Project Type:** Talk**Project Category:** Arts and Humanities

Abstract: Bilateral saccadic eye movements have been shown to improve memory retrieval, a finding known as saccade-induced retrieval enhancement (SIRE). Bilateral eye saccades are quick, alternating rightward and leftward movements of both eyes in the same direction. Engaging in these saccades prior to retrieval has been shown to improve the accuracy of eyewitness memory (Lyle & Jacobs, 2010). The purpose of this study was to determine whether saccades could also reduce the cross-race effect. The cross-race effect (CRE) in face recognition is the robust finding that people are better at recognizing faces from their own race, relative to other races (Feingold, 1914). To test the potential of SIRE to reduce CRE in eyewitness identification, either African American or Caucasian participants viewed a staged crime video with either an African American or Caucasian perpetrator. They then had to select the perpetrator from a photo lineup. Prior to the lineup, the participants completed either the saccade or neutral fixation task. It was hypothesized that identification accuracy would be higher in the saccade than the fixation condition. Additionally, it was hypothesized that the CRE would be obtained when the race of the participant and the perpetrator did not match. Finally, we hypothesized that the CRE would be eliminated for participants in the mismatch condition who engaged in bilateral saccades prior to viewing the lineup. None of the findings were significant. No CRE or SIRE effect were found, however, the findings will be discussed in terms of their potential implication for providing an effective method toward reducing CRE in eyewitness identification.

PSE-15**Name, Major:** Alex Hughes, Biological Engineering**Project Name:** *Using Sire-Directed Mutagenesis to Investigate Protein-Nanoparticle Adsorption***Faculty Advisor, Department:** Nicholas Fitzkee, Department of Chemistry**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Nanoparticle technology has been a growing field in biomedical research. The diversity of applications of nanoparticles from drug delivery to therapeutics yields a promising future for the field. In order to integrate nanoparticles into common medicine, their interactions with biomaterials must first be readily understood. In order to study the interactions between nanoparticles and protein binding, the GB3 protein was chosen as a model. GB3 has been found to contain several lysine residues along the protein's periphery when folded. It is hypothesized that these charged residues are a key component in gold nanoparticle-protein binding. This hypothesis was tested by mutating the GB3 protein to change the positively charged lysine residues to neutral alanine residues. Primers were made in order to change only one lysine at a time in order to test the specific binding capacity of the changed residue. NMR was used to ensure the proteins remained folded as usual before known concentrations of protein were added to known concentrations of gold nanoparticles of the desired size. Ensuring the only variable to change between the trials with the different mutants was the lysine to alanine mutation allowed for the statistical analysis of each lysine residue's effect on the binding capacity of GB3 as a whole. With this knowledge, the general rules for nanoparticle-protein binding can begin to be more fully understood making nanoparticles a more viable and reliable tool in modern day biomedicine.

BSE-20**Name, Major:** John Hunt, Biological Engineering**Project Name:** *Purification of Isotopic Labeling of the Regulatory Domain of Calcineurin***Faculty Advisor, Department:** Nicholas Fitzkee, Department of Chemistry**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Calcineurin (CaN) is a highly conserved intracellular serine/threonine protein phosphatase that has important roles in various signaling pathways, such as the activation of T-cells, central nervous system function and cardiac development in humans. Calcineurin is activated by binding a calcium-bound messenger protein, Calmodulin (calcium-modulated protein, or CaM). Previous studies have shown that the region between the B-chain and the catalytic domain of CaN is disordered. However, when calcium-loaded CaM binds with CaN regulatory domain (RD), the disordered region then adopts at least one stable α -helix. Our research is aimed at understanding the intermolecular interactions that characterize this transformation. Our methods involve the use of NMR spectroscopy to identify the structural determinants of binding. We therefore utilize a method of purification called Fast Protein Liquid Chromatography (FPLC) to purify CaN from transformed E.coli cells. Our technique combines two types of affinity chromatography: a nickel-nitroloacetic acid (Ni-NTA) matrix to selectively bind histidine residues, followed by a CaM-sepharose column to select for CaM-binding proteins. Both of these columns specifically bind to the RD in very different chemical environments, and their combination allows essentially all potential impurities to be removed. Purity has been assessed using polyacrylamide gel electrophoresis (SDS-PAGE) and HSQC-based NMR experiments.

BSE-21**Name, Major:** Rachel Hybart, Biological Engineering**Project Name:** *Qualitative Analysis of Vascular Calcification***Faculty Advisor, Department:** Chartrisa Simpson, Biomedical Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Vascular calcification occurs when the smooth muscles cells undergo a phenotypic switch into osteoblasts. The search for therapies that can reverse or prevent this calcification is of increasing interest in medicine today. In order to counteract this change with new therapies, the mechanism behind the switch must be fully understood. To understand this mechanism, the increase in calcium and phosphate must be observed at various points in the phenotypic change. The fluorescent stain, xylenol orange easily stains calcium mineral and could differentiate newly formed osteoblast-like cells from the smooth muscle cells. Cells will be grown in a calcification media containing dibasic sodium phosphate, which induces calcification. The xylenol orange fluorescent stain will then be used to identify mineral deposits. The stain will make it clear where the calcification is located in the cell culture, as well as how quickly the phenotypic change occurs once the calcification media is added. Observing the increase in mineral deposition is only the first step. In the future, these observations will be used to determine what other markers signal the change into osteoblasts. Other fluorescent stains such as calcein blue can be used to observe them. Once the observations have been made on the mechanism, in the future staining will be used to observe how different types of therapies work effectively to reduce calcification.

BSE-22**Name, Major:** Anna Jackson, Biological Sciences**Project Name:** *Carrying on the Torch: Determining Translocation Effectiveness for the Critically Endangered *Cyclura carinata****Faculty Advisor, Department:** Mark Welch, Biological Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Animal translocation is an important conservation strategy for the introduction or restoration of endangered species to viable habitats. However, translocation may present long-term issues related to inbreeding depression and reduced genetic variability. Ideally, subsequent generations descended from translocated “founders” would retain a level of heterozygosity comparable to the source animals. This outcome is not always achieved especially when a small number of animals is relocated thus simulating a bottleneck effect. *Cyclura carinata*, a critically endangered iguana species endemic to the Turks and Caicos Islands, currently dwells in just 5% of its historical range. The species represented a prime candidate for a translocation program initiated in 2002. Two separate groups of iguanas in equal sex ratio were translocated from the source island of Little Water Cay to either Middle Cay or Bay Cay. Eighteen individuals were placed on Middle Cay, while 58 individuals were placed on Bay Cay. Between 2002 and 2015, samples of iguana blood from individuals captured on both islands were collected. Twenty-four microsatellite markers known to be polymorphic in *C. carinata* were amplified in both founding populations and in captured individuals. *GenAIEx* was used to determine heterozygosity across years. *Colony* software was then used to predict parentage probabilities for each captured individual. A successful translocation would be indicated by a preserved level of heterozygosity in subsequent generations of iguanas and by difficulty in the assignment of probable parents to offspring. The latter would signify that reproductive turnover has occurred and that descendants of the original founding iguanas, rather than the founders themselves, have reached sexual maturity and are actively contributing to the proliferation of the species in the translocated populations. The pattern of parentage probabilities in Bay Cay suggest a successful translocation. Iguanas on Middle Cay, though increasing in number, produced an unexpected pattern of parentage probabilities.

SS-13**Name, Major:** Taylor Jefferson, Psychology**Project Name:** *Test-Retest Reliability of Self-Reported Lifetime History of Aggression***Faculty Advisor, Department:** Samuel Winter, Psychology**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Test-Retest Reliability of Self-Reported Lifetime History of Aggression Kilgore, J., Salem, T., Jefferson, T., Pearson, M., Nadorff, M. R., & Winer, E. S. We examined test-retest reliability of the 11-item self-report Life History of Aggression (LHA) scale (Coccaro et al., 1997). Test-retest reliability is important to psychological measurement, because it establishes that a psychological assessment is consistent over time and thus is a dependable measure of an underlying trait construct. The LHA measures lifetime aggressive and antisocial acts using a 6-point scale (0 = "Never," 5 = "So many times I could not give a number"). The LHA was administered online via Amazon.com's Mechanical Turk as part of a larger longitudinal study. Participants who completed wave 1 were contacted for follow-up waves spaced 1-4 months apart and paid \$1-3 per wave. Spearman correlations were computed for the full scale LHA and for each of the three subscales for waves 1 and 2 (N = 360) and waves 3 and 4 (N = 165). All coefficients were significant at $p < .05$. For waves 1-2, high reliability was evidenced by scores on the full LHA scale ($r = .77$) as well as scores on the other-directed aggression ($r = .75$), self-directed aggression ($r = .76$), and antisocial behavior ($r = .70$) subscales. For waves 3-4, moderate reliability was evidenced by scores on the full LHA scale ($r = .64$) as well as scores on the other-directed aggression ($r = .65$), self-directed aggression ($r = .64$), and antisocial behavior ($r = .59$) subscales. Thus, LHA full scale and subscale scores yielded test-retest reliability comparable to other life history measures assessing behaviors such as tobacco use (Brigham et al., 2009), alcohol use (Friesema et al., 2004), and gambling (Sartor et al., 2007).

AH-10**Name, Major:** Damien Jones, Psychology**Project Name:** *Do Students Believe That Nonprescription Stimulants are Safe?***Faculty Advisor, Department:** Kristina Hood, Psychology**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: The Substance Abuse and Mental Health Services Administration (SAMSHA; 2013) reports that the amount of emergency department visits due to non-prescription stimulant (NPS) use has increased between 2005 and 2010. This increase could be due to college students' perceptions of NPS use. They do not perceive consuming NPS is as harmful or as addictive as other drugs (Blair, 2013), although ER rates have increased and evidence has emerged to the contrary. Limited data exists regarding perceptions of ER visits related to NPS use between users and non-users. The current study examined whether users and non-users had different perceptions of ER visits from using NPS's. By understanding how stimulant users and non-users view NPS use, we can create interventions to influence attitudes towards NPS use. Undergraduate students (N = 393) at a large southeastern university completed an online survey that included questions about individuals' NPS use, perceptions of NPS health risks, and likelihood of ER visits due to NPS use. Of participants in the study, 18.3% ($n = 72$) had consumed a NPS in their lifetime. Non-parametric analyses (Kruskal-Wallis analyses) examined differences between users' and non-users' beliefs about health dangers associated with NPS use. Results showed that non-users reported perceptions that people have side effects that requires a trip to the ER more than users reported. Non-users also reported that they believe that consuming a NPS leads to an ER visit more than users did. These results suggest that NPS use influences individuals' beliefs about the dangerousness of NPS use. Particularly users may be less inclined to view NPS use as something that could end in a hospital visit. Results can guide education courses and intervention programs to inform individuals of the potential health risks of NPS use.

PSE-16

Name, Major: Veera Karri, Computer Science

Project Name: *Designing Natural Movements for a Therapeutic Robotic Dog*

Faculty Advisor, Department: Cindy Bethel, Computer Science & Engineering

Project Type: Poster

Project Category: Physical Sciences and Engineering

Abstract: Therabot™, a therapeutic robotic support system in the form of a small dog, is being developed to provide support to individuals undergoing therapy for conditions like Post-Traumatic Stress Disorder (PTSD). The robot will be used to provide comfort to individuals receiving care and to supplement clinician-guided therapy sessions by guiding therapy exercises at home. It will also be used in supervised therapy sessions as a form of support. A primary challenge involved in creating a therapeutic robotic dog is generating natural movements. The movements of various parts of the robotic dog should be as life-like as possible. We have designed an interface that allows both novice and experienced users to design movements for the robot using simple techniques similar to those employed in traditional computer animation. This allows the rapid formation of a library of movements and easy adaptation of movements. In addition, the system also adapts user-supplied movements to produce an overall more consistent and desirable robotic behavior. The velocity variation (acceleration) curve for each actuator is modified to vary according to the current position, goal position and the current velocity instead of using the default velocity variation curve produced by the motors, resulting in smoother movements and transitions between movements. Additionally, the robot's sound production is linked with its movements, allowing variations in joint movement to impact the intensity and type of sounds produced. This work details the design, implementation, and evaluation of the movement system for Therabot™.

SS-14

Name, Major: Sarah Kelly, Human Sciences (Food Nutrition & Dietetics)

Project Name: *Does Working as a Camp Counselor at Fun with Food Camp Affect Career Development in Undergraduate Nutrition Students*

Faculty Advisor, Department: Sylvia Byrd; Food Science, Nutrition, and Health Promotion

Project Type: Poster

Project Category: Social Sciences

Abstract: The detrimental affects of obesity and chronic diseases on overall health of Americans are evident. Problems can be addressed through experiential learning opportunities to teach participants about food production, food preparation skills, food safety procedures, knife skills, and grocery shopping. Fun with Food Camp utilizes Nutrition majors as counselors for the weeklong camp. Counselors coach campers through lessons, making counselors vital to the success of camp. Responsibilities of counselors include facilitating understanding of lessons and re-teaching material to campers. The volunteer camp counselors, or future Registered Dietitians, will parlay these experiences in future careers. The goal of this research is to examine the effects of working as a counselor during the weeklong camp and the effect on career development. Therefore, this project is looking to identify specific skills gained, how they are gained, and how they are implemented into careers. This will be accomplished by asking counselors from 2011-2015 (n=43) to complete an online survey. Social Cognitive Theory was applied in terms of self-efficacy and skill sets learned through being a counselor. The survey for this study was loosely based on the Youth Experiences Survey (YES 2.0) and 4H counselor surveys. It starts off with open-ended, qualitative questions and ends with questions attached to a four-point scale (Not At All, A Little, Quite a Bit, or A Lot). The purpose of this survey is to determine what, if any, skills counselors believed they gained and how they are utilizing those skills for career development.

BSE-T12**Name, Major:** Emmy King, Animal & Dairy Sciences**Project Name:** *Impact of housing type and probiotics on growth and performance of dairy calves***Faculty Advisor, Department:** Stephanie Ward, Animal & Dairy Sciences**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Twenty Holstein calves were split into four groups of five and each group consisted of calves with an age difference of no more than 3 days between the oldest and youngest calves. Another 20 calves were housed in individual pens, giving a total of forty Holstein calves. Each calf was fed 1.5 gallons of milk per day for 5 weeks; at 5 weeks of age, calves were given 1 gallon of milk per day until they were weaned at 6 weeks. Group housed calves were fed from a multi-nipple bucket. Starter was offered at 3 d of age, starting with 1 lb and increased by 1lb each time weighbacks were = 0. The treatments were 1) Individual Housing+Yeast (IY); 2) Individual Housing -Yeast (IN); 3) Group Housing +Yeast (GY); 4) Group Housing-Yeast (GN). Dry matter intake was measured daily and feed and weighbacks were sampled weekly. Body weight, hip height, wither height, and heart girth was measured weekly for each calf. Behavior analyses were completed for each calf at ages 3 and 6 weeks. Latency feed was recorded for weaned calves that were turned out on pasture at 8 weeks of age. Effects of treatment, sex, housing, week, day, and behavior were analyzed using SAS. Dry matter and nutrient intake was similar across all treatments, with calves averaging 1.5 kg DM/d. Calves housed in groups were lighter than those housed as individuals (139 kg v. 147 kg BW, $P < 0.03$), but the addition of yeast to the diet did not affect body weight. Average daily gain was similar across treatments, averaging 1.3 kg/d. The results of this study indicate that calves can be housed in groups as large as 5 without detrimental effects on growth, intake, or performance.

BSE-23**Name, Major:** AnneMarie Kovach, Biological Engineering**Project Name:** *Targeted Drug Delivery via Nanoparticles: Novel Treatment for Canine Osteosarcoma***Faculty Advisor, Department:** Raj Prabhu, Agricultural & Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Osteosarcoma is the most common bone tumor found in dogs. This cancer is known for its aggressiveness because metastasis typically occurs prior to diagnosis. Eighty percent of canine cases will die from tumor related complications. Current therapeutic approaches are limited to amputation, limb-salvage surgery, and chemotherapy. Survival rates are only 25% at the two-year mark following treatment. The present work explores engineering a minimally invasive, targeted drug delivery system that promises a more effective treatment for canine osteosarcoma. The base of the system is a magnetic nanoparticle. VEGF antibodies and ligand CD80s are functionalized to the biocompatible coating of the nanoparticle using a modified Ocean NanoTech (San Diego, CA) protocol. The VEGF antibody targets the antigens associated with osteosarcoma tumors. Then, ligand CD80 induces apoptosis, or cell death, when interaction occurs with CTLA-4 receptors, also found on the tumor. This treatment has the potential to reduce negative side effects seen in present treatments by more effectively targeting cancerous cells. The VEGF+CD80 combination was found to be the most effective in a previous study. This investigation was to find the optimal concentration of VEGF+CD80 (0.1, 1, 10, or 100 $\mu\text{g/ml}$) needed to reduce canine osteoblast proliferation. Nanoparticles were introduced to plates seeded with $3.00\text{E}+05$ canine osteoblasts over 72 hours, with one inoculation occurring every 24 hours. Cell counts were performed every 24 hours, before the addition of more nanoparticles, to determine the rate of cell proliferation. When comparing the different concentrations at the 72 hour mark, the osteoblasts exposed to 1 $\mu\text{g/ml}$ nanoparticles were at a cell population significantly lower (66%) than that of the untreated case. With this data along with the cell counts for 24 and 48 hour marks, it is concluded that the optimal concentration of proteins for this targeted drug delivery system is 1 $\mu\text{g/ml}$.

PSE-T02**Name, Major:** Ronald LaCour, Chemical Engineering**Project Name:** *Ligand Displacement from Gold Nanoparticles Using Sulfide***Faculty Advisor, Department:** Dongmao Zhang, Chemistry**Project Type:** Talk**Project Category:** Physical Sciences and Engineering

Abstract: Gold nanoparticles (AuNP) are currently being applied to topics as diverse as solar energy harvesting, drug delivery, and catalysis. These applications stem from the ability of ligands to bind to the AuNPs. Thiols are the most often used ligand to bind to AuNPs, as sulfur forms a strong bond with gold. There are currently limited nondestructive methods to remove ligands from AuNPs. Presented here is an exploration of the ability of NaHS, Na₂S, and elemental Sulfur to remove small ligands from the surface of AuNPs. This displacement is explored through both surface-enhanced Raman spectroscopy and UV-visible spectroscopy. Furthermore, the mechanism behind the displacement is investigated through a series of experiments involving pH measurements. This work will be important for future studies involving sulfur-gold nanoparticle interactions.

AH-T02**Name, Major:** Rachel Laird, Secondary Education (English)**Project Name:** *"Don't Belong Anywhere": A Reader Response to Biracialism in To Kill a Mockingbird and the Modern South***Faculty Advisor, Department:** James Kelley, English**Project Type:** Talk**Project Category:** Arts and Humanities

Abstract: This project explores the concept of reader response theory of literature in the context of the personal response of the author to the theme of biracialism in Harper Lee's *To Kill a Mockingbird*. The author draws analogies to the novel from events from her own childhood in order to learn lessons about right, wrong, and our common humanity.

SS-15**Name, Major:** Harrison Lang, Agricultural Information Science**Project Name:** *The Academic Impact of a Collegiate Judging Experience***Faculty Advisor, Department:** Laura Lemons, Human Sciences**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Collegiate livestock judging programs teach students to evaluate livestock. However, more importantly, former judges say that their experience was fundamental in development of important "soft skills" including verbal communication, confidence, ability to work well with others, assertiveness, patience, and time management (Cavinder, 2011). A frequently cited concern of students and parents is potential impact on student academic performance. While research has been conducted on life skill development and professional achievement of former collegiate judging team members, no research was found by the investigator demonstrating impact on academic performance of collegiate judging experience. Therefore, the purpose of this study was to examine collegiate livestock judges' grade point average at the beginning of the semester and at the end of the semester. The National Collegiate Coaches Association provided collegiate judges' grade point averages at the beginning of the fall semester prior to their first semester judging, as well as their GPA at the conclusion of the subsequent spring semester. A sample of 424 student GPA pairs was provided for analysis. A paired-samples t-test was used to determine any significant difference in grade point averages. No statistically significant, nor practical difference was found between the beginning and concluding GPAs. It can be concluded from this research that collegiate judges experience no impact on their overall academic performance as a result of their participation, but can gain other non-academic benefits.

BSE-24**Name, Major:** Jaslyn Langford, Biological Sciences**Project Name:** *RAGE Signaling is Intersected by Rap1A Crosstalk in Fibroblasts in Diabetic Hearts***Faculty Advisor, Department:** James Stewart, Biological Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Rap1a is a member of the Ras GTPase superfamily that acts as a molecular switch coupling extracellular events to intracellular signaling. The purpose of this study was to identify a role for Rap1a in the AGE/RAGE signaling cascade. We hypothesized that Rap1a GTPase intersects the downstream signaling modulators of the AGE/RAGE signaling cascade to promote extracellular remodeling and fibroblast function in the diabetic heart. Initial observations demonstrated significantly elevated Rap1a protein expression levels in cardiac fibroblasts isolated from diabetic hearts. Therefore, a series of studies were performed to alter Rap1a activity and protein levels to determine the influence of Rap1a in AGE/RAGE signaling cascade. Cardiac fibroblasts were isolated from diabetic (db/db) fibroblasts and non-diabetic (het) fibroblasts. A Rap1a-EPAC agonist was used to increase Rap1a activity and protein levels resulting in elevated AGE/RAGE signaling markers, such as PKC- ζ and ERK1/2 phosphorylation, α -SMA, and RAGE protein levels. Furthermore, silencing Rap1a protein expression decreased PKC- ζ and ERK1/2 phosphorylation, α -SMA, and RAGE as a result of Rap1a siRNA treatment. These studies demonstrated that Rap1a crosstalk occurred in the AGE/RAGE cascade. Rap1a involvement in the AGE/RAGE cascade identifies a new molecular mechanism, which could further potentiate fibroblast differentiation and ECM remodeling in diabetes. Deactivation of this mechanism represents a potential therapeutic approach to regulate fibroblast phenotype changes, collagen accumulation, and RAGE expression.

PSE-17**Name, Major:** Molly Leasure, Biological Engineering**Project Name:** *Mechanical Modeling of Nitinol Hip Implants***Faculty Advisor, Department:** Scott Thompson & Nima Shamsaei, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Hip implants are typically made with titanium, cobalt chromium or other hard metals, and have been manufactured the same way for many years. As the percentage of elderly persons in the population continues to increase, the need for implants to be durable and to last longer becomes more critical. One of the important challenges in engineering and manufacturing metallic implants is stress shielding. In hip implants, stress shielding occurs when the normal stress of the femoral bone is replaced by that of the implant. This variation in stress causes the body to diminish the amount of nutrients being provided to the affected area and subsequently reduces the bone density. This stress variation is driven by discrepancy in the Young's modulus, a material property, of the bone and the implant. Over the last semester, a metallic hip implant was designed and analyzed for its eventual additive manufacture. Computer-aided drawing (CAD) software was utilized to draw three-dimensional implants. Initial hip implant designs were motivated from those reported in the open literature, consisting of oval stems as the cross-section. The hip implant was imported to commercial finite element analysis (FEA) software for its mechanical assessment and prediction of stress distribution, based on typical loading boundary conditions. The material properties of Nitinol were utilized for FEA of the hip implant. Nitinol's Young's modulus can easily change based on external loading, and this allows it to better mitigate and replicate the stresses of the original bone. Nitinol has two forms: austenite, which occurs at a high temperature, and martensite, which is weaker and occurs at a lower temperature. Austenite has a relatively high Young's modulus, while austenite's Young's modulus is lower and is more sensitive to loading. This variety helps the implant to best match the mechanical properties of the femur bone.

BSE-25 *****Name, Major:** Tammie Lee**Project Name:** *Computational Biology***Faculty Advisor, Department:** Andy Perkins, Computational Biology**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Computational Biology will assist on promoting Engineering Fundamental Community Involvements that will assist with Computer Science and Biology Majors merging and developing exploration projects with the enjoyment of life forms.

BSE-26**Name, Major:** Racheal Lemire, Animal & Dairy Sciences**Project Name:** *Comparative Profiling of Regulatory MicroRNAs Involved in Skeletal Muscle Development and Composition in Divergent Breeds of Beef Cattle***Faculty Advisor, Department:** Derris Burnett, Animal & Dairy Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Skeletal muscle is a heterogeneous tissue that is composed of muscle, fat, and connective tissue cells. The proportions of these cell types determine muscle composition and metabolic disposition. MicroRNA (miRNA) are a class of small non-coding RNA that regulate developmental processes including muscle growth and composition. miR143 and miR206 are myogenic miRNA's that promote muscle growth. , miR133 and miR130a are involved in adipogenesis. In the current project, miRNA responsible for myogenesis and adipogenesis were profiled in 3 divergent breeds of cattle. Muscle biopsies were collected from the Longissimus muscle of Purebred Brahman (n = 2), Crossbred Brahman (n = 2), and Crossbred Continental type cattle for miRNA analysis. Total RNA was isolated from each biopsy and enriched for miRNA before being subjected to cDNA synthesis using reverse transcriptase. The resulting cDNA was then subjected to targeted miRNA profiling using predesigned assays and Sybr detection chemistry. miR103 served as an endogenous control gene for relative quantification of miRNA expression using the delta-delta Ct method.

PSE-18**Name, Major:** William Leonard, Industrial Engineering**Project Name:** *A Gap Analysis of Wildland Fire Response Resources in the United States-Capacity Assessment***Faculty Advisor, Department:** Hugh Medal & Robert Grala; Industrial and Systems Engineering & Forestry**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: The purpose of this research project is to obtain the opinions of federal- and state-level fire and land managers on current fire suppression resource availability to respond to existing and potential wildfire threats. The first phase of the project involved constructing a survey for fire and land managers that would procure the needed data. Also, the names and contact information of more than a thousand officials were gathered to ensure that the expected number of responses would be high enough to seem statistically significant. Next, the survey was released to the persons whose information had been collected, with instructions to forward the survey to other officials with a knowledge of fire response capabilities, if possible. The anticipated outcome of the research project is the analysis of the current "gap" between needed and actual fire suppression resources in a worst-case scenario. The findings are hoped to be useful in determining which locations deserve the benefit of such resources during a wildfire event.

BSE-27**Name, Major:** Richard Leonard III, Mathematics**Project Name:** *Mathematical Model of Alzheimer's Disease with Inhibitory Drugs***Faculty Advisor, Department:** Shantia Yarahmadian, Mathematics & Science**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Every sixty-seven seconds someone in the United States develops Alzheimer's disease. According to WHO of the top causes of death, Alzheimer's disease is in the top ten with an upward trend. It is estimated that by 2050, 13.8 million people will have Alzheimer's disease compared to 5 million today. The leading hypothesis for the cause of Alzheimer's disease is the formation of Amyloid-Beta-42 (AB42) polymers that obstruct the flow of electrons through the brain causing memories to be forgotten. This process occurs when a mutated protein (Amyloid Precursor Protein or APP) begins to break down enzymes in cell membranes into a sticky AB42 monomer. These monomers then go through a polymerization process where they attach to one another and form nuclei. These then go through elongation and yield AB42 polymers. In this work, I take governing equations previously found in research published in Science magazine and add to them terms that model the presence of certain inhibitory drugs. The first proposed drug attaches to monomers and stop them from going through the polymerization process. The second proposed drug attaches to polymers and clears them from concentration completely. While some research has proposed such a monomer inhibitory drug exists, an AB42 polymer clearing drug has been found in a research lab in Japan. After obtaining these models, I analyze them with varying inputs to see how the steady state reacts. This research is relevant not just to the advancement of mathematical biology but to the entire world as Alzheimer's disease is a global problem and through my research, we understand a little more about how it is that we can cure it or eradicate it completely.

BSE-28**Name, Major:** Mark Lewis, Biochemistry**Project Name:** *Effect of Dietary Lysine on the Expression of Myosin Heavy Chain IIb Isoform in Porcine Longissimus Dorsi Muscle***Faculty Advisor, Department:** Shengfa Liao, Animal & Dairy Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Lean meat (i.e., the skeletal muscle) is the desired component of pork. Myosin, the most abundant contractile protein, constitutes approximately 45% of total myofibrillar proteins, among which major heavy chain IIb (MyHC-IIb) appears to be the determining one contributing to pig muscle growth. This study was conducted to determine how dietary lysine level affects the expression of MyHC-IIb mRNA in pig skeletal muscle, as lysine is the first limiting amino acid in typical swine diets. Nine crossbred barrows (94.4 ± 6.7 kg) were randomly assigned to 3 groups respectively fed Diets 1 (lysine-deficient), 2 (lysine-adequate), and 3 (lysine-excess), which contained 0.43, 0.71, and 0.98% total lysine, respectively. After 5 weeks on the trial, pigs were slaughtered and approximately 2 g of sample was collected from the middle portion of the Longissimus dorsi muscle of each pig. Real-time RT-PCR technology was employed to determine the abundance of MyHC-IIb mRNA in each sample using $\Delta\Delta$ CT quantitative method. Results showed that there was no difference ($P > 0.42$) in the MyHC-IIb mRNA abundance between the pigs fed Diet 1 and Diet 2, as well as between the pigs fed Diet 3 and Diet 2. These results suggest that changing dietary lysine level to either below or above the adequate requirement level does not affect the abundance of MyHC-IIb mRNA in Longissimus dorsi of finishing pigs. Since our previous study using these pigs showed that the loin eye areas of the pigs fed Diets 2 and 3 were increased by 18 and 9% when compared with Diet 1, respectively, we further hypothesized that the level of dietary lysine has a significant effect on the MyHC-IIb protein abundance in the Longissimus dorsi of finishing pigs. Therefore, our next study will be to quantify the MyHC-IIb protein in these Longissimus dorsi samples.

BSE-29**Name, Major:** Sallie Lin, Biological Engineering**Project Name:** *Investigating the Unique Viscoelastic Properties of Tricuspid Valve Leaflets***Faculty Advisor, Department:** Jun Liao, Agricultural & Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Approximately 8-35% of the population experiences tricuspid regurgitation, where blood flows backwards from the right ventricle into the right atrium. A better understanding of the biomechanical behavior of tricuspid valve leaflets (TVLs) will provide a strong foundation for surgical repairing. Our focus is hence to thoroughly characterize the viscoelastic properties of the TVLs. Tricuspid anterior and septal leaflets from ~6 month old pigs were obtained from a local abattoir. Leaflets were dissected into 18mm x 4mm dog bone-shaped samples along circumferential direction. After preconditioning, tissue samples were subjected to stress relaxation, creep, and failure testing. For stress relaxation, sample was pulled to 200g load and held at final position for 15 minutes, while recording stress decay. For creep, sample was pulled to 200g and maintained at this load for 15 minutes. Both the anterior and septal leaflets showed a stress relaxation often observed in soft tissues (anterior: $37.177 \pm 6.059\%$ stress reduction; septal: $37.623 \pm 4.537\%$ stress reduction). However, minimal creep was observed for both leaflets (anterior: $1.641 \pm 0.295\%$ strain increase; septal: $2.551 \pm 0.696\%$ strain increase). The failure stress is 1.184 ± 0.656 MPa for anterior and 1.119 ± 0.419 MPa for septal leaflets; the failure strain is 0.558 ± 0.140 for anterior and 0.700 ± 0.060 for septal leaflets. We concluded that the TVLs have unique viscoelastic properties, of which they have a typical stress relaxation but exhibit negligible creep even beyond the physiological loading range. The anterior leaflets show slightly less creep and greater stiffness than the septal. Future testing will include the posterior leaflet and chordae tendineae.

BSE-30**Name, Major:** Moriah Lorge, Animal & Dairy Sciences**Project Name:** *Characterization of Residual Antigen in a Porcine Osteochondral Xenograft***Faculty Advisor, Department:** Steve Elder, Agricultural & Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: There are relatively few treatment options for large chondral lesions which can cause joint pain and swelling and which may progress to osteoarthritis. Our goal is to develop a porcine osteochondral xenograft as an alternative treatment for focal chondral defects of the tibiofemoral joint. Previous research has shown that porcine cartilage is not immunoprivileged and will undergo chronic rejection unless steps are taken to minimize residual antigen. The purpose of this study was to characterize residual antigen in a porcine osteochondral xenograft after a multi-step treatment designed to maximize antigen removal while preserving the tissue's collagenous structure. Cylindrical osteochondral plugs were extracted from porcine stifle joints and treated sequentially with hydrogen peroxide, chloroform:methanol, hyaluronidase, sodium dodecyl sulfate, and nucleases. The extent of antigen removal was determined based on presence of nuclear remnants in histological sections (hematoxylin and eosin), presence of the alpha-Gal epitope (fluorescence immunohistochemistry), DNA content (Hoechst assay), and presence of vimentin as a marker of cytoplasmic protein (Western blotting). Preservation of collagen architecture was gauged from the collagen content (chloramine-T assay) and histology (H&E, picro-sirious red). The antigen removal procedure eliminated almost all traces of cellular material from cartilage and bone lacunae and reduced DNA content by approximately 90%. It also eliminated approximately 90% of vimentin. Alpha-Gal was detected only in the bone, and preliminary data indicate that it was not substantially altered by the antigen removal treatment. Antigen removal had negligible impact on collagen content and organization. We conclude that the treatment removed antigen with a high degree of efficiency, the persistence of alpha-Gal being a notable exception. Furthermore, the protocol does not disrupt the tissue's collagenous framework, rendering it suitable for stabilization through collagen crosslinking.

BSE-31**Name, Major:** Kathryn Lott, Poultry Science**Project Name:** *The Male and Female Contribution to Parthenogenesis-Induced Fertility***Faculty Advisor, Department:** Chris McDaniel, Poultry Science**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Parthenogenesis (P), embryonic development in unfertilized eggs, reduces sperm-egg penetration (SEP) and fertility when birds are mated. However, it is unknown if the male or hen is responsible for P-induced infertility. Therefore, the objective of this research was to determine which sex of Chinese Painted Quail is responsible for the decrease in SEP due to P. Two genetically selected lines of birds were used in this study, one selected for P and one not selected for P, controls (C). A 2 x 2 factorial arrangement of sex and line was utilized to create 4 breeding treatments: C females with C males, C females with P males, P females with C males, and P females with P males. Daily, eggs were collected and examined for albumen pH. Germinal discs were observed at 2x magnification and classified as fertile, infertile no development, or parthenogen. The perivitelline layer was removed and examined microscopically for SEP holes. No sex by line interactions were detected. However, the number of SEP holes, the percentage of eggs containing any SEP, and fertility were lower for P males than C males. Additionally, the percentage of eggs containing parthenogens was higher in P hens than C hens. This increase in parthenogens is likely why albumen pH was also lower for P hens as compared to C hens, because parthenogens yield lower pH values than unfertilized eggs without development. Also, P males yielded lower albumen pH values than C males. Confirming that eggs were correctly classified, the number of SEP holes as well as the percentage of eggs that contained any SEP was significantly higher in eggs classified as fertile as compared to those that were classified as infertile or parthenogen. Furthermore, the percentage of eggs without any SEP was higher in eggs classified as infertile as compared to parthenogen. There were negative correlations for the incidence of parthenogens with SEP, fertility, and pH. However, fertility was positively correlated with SEP and pH. In conclusion, the male was responsible for the decrease in SEP and fertility in birds selected for P. Perhaps P males have poor semen quality resulting in an inadequate number of sperm reaching or bind to the perivitelline layer.

PSE-T03**Name, Major:** Kris Madsen, Physics**Project Name:** *Relativistic Twisted Electron Mott Scattering***Faculty Advisor, Department:** Dipankar Dutta, Physics**Project Type:** Talk**Project Category:** Physical Sciences and Engineering

Abstract: In the past five years, several groups have shown that it is possible to imprint large amounts of quantized orbital angular momentum onto freely propagating electrons. Due to the fertility of scientific and technological achievement surrounding an allegorical property in photon beams, a great deal of interest in understanding and applying these 'twisted' electrons. It has been suggested that by using the OAM state of a free electron as a degree of freedom in nucleon scattering, the angular momentum states of the constituent quarks may be probed. With the goal of eventually creating such an experiment, a simulation to investigate the Mott scattering cross section of twisted electrons is in development. If deviations between the twisted and plane wave Mott scattering cross sections are significant enough, Mott scattering could serve as a diagnostic tool for a high energy beam of twisted electrons.

BSE-T13**Name, Major:** Alexis Manson, Biochemistry**Project Name:** *Identification and Analysis of Volatile Organic Compounds in Macrophomina phaseolina (Charcoal Rot Fungus) in Sweet Potato Root Isolates***Faculty Advisor, Department:** Richard Baird, Biochemistry**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: *Macrophomina phaseolina* (*M. phaseolina*) is a destructive soilborne fungal pathogen that proliferates in arid climates and causes diseases in plants such as damping off, seedling blight, wilt and charcoal rot. Infecting numerous plant species such as corn, sweet potato, and soybean, *M. phaseolina* bears a great economical significance to agriculture and being able to identify its various isolates as well as determining its methods of pathogenesis are paramount in discovering prevention practices. One possible way to achieve these goals is in not only the analysis of the volatile organic compounds (VOCs) released from the fungus but the possible correlation of the variation in VOCs to the virulence of the pathogen. This study focused on the possible variation in VOCs between morphologically different isolates of *M. phaseolina*. Upon isolation, *M. phaseolina* can appear "flat", "fluffy", or an intermediate of the two. A large pool of over 100 sweet potato isolates was placed into these morphological groupings and then a randomization process was used to select replicate isolates to perform VOC studies. The VOCs were collected using solid phase microextraction (SPME) fibers and analyzed using a Gas Chromatography-Mass Spectrometer (GC-MS). These results will be discussed using various statistical comparisons.

SS-16 *****Name, Major:** Sara Maples, Agricultural Information Science**Project Name:** *Using Social Network Analysis to Identify Potential Volunteer Leaders in Nonprofit Organizations***Faculty Advisor, Department:** Laura Lemons, Human Sciences**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Millions of individuals volunteer for nonprofit organizations yearly. Among these millions are volunteer leaders who step-up to help their organizations achieve positive social change in their communities. "Volunteer leadership remains a vast untapped resource for nonprofits...these leadership roles, if properly supported, cultivate the consciousness, capabilities, and commitment in volunteers, and create lifelong advocates for causes and the change that citizens seek to make in their communities" (Cooperation, 2007, p. 15). In this study, social network analysis was used to identify volunteer leaders in three groups at a nonprofit organization. Social network analysis allows researchers to create a visual representation of connections between individuals. Participating volunteers indicated their communication habits within their respective groups on a self-reported survey. ForceAtlas2 analysis was used to generate networks of nodes (volunteers) and edges (connections) to determine leaders within each group. The identified leaders were compared to leaders identified by the nonprofit director of the organization. The social network analysis revealed leaders in each of the three volunteer groups. The leaders identified in the social network analysis mirrors those selected by the nonprofit director with the exception of one volunteer group. This can be explained by the fact that the nonprofit director is more closely involved with two of the three groups making identifying leaders more accurate. Alternatively, the nonprofit director could have identified leaders based on leadership skills other than communication. Researchers suggest inviting the identified volunteer leaders to a training focused on developing their leadership skills further. Following the training, a post social network analysis should be conducted to determine if the outlying volunteer leaders have changed positions within the volunteer group network. The researchers plan to conduct this follow-up study to determine the value of leadership training in nonprofit organizations.

SS-17

Name, Major: Kaitlyn May, Educational Psychology

Project Name: *Technology and Education*

Faculty Advisor, Department: Anastasia Elder, Educational Psychology

Project Type: Poster

Project Category: Social Sciences

Abstract: The aim of this systematic review is to examine the impact of the use of technology with various variables for the purpose of addressing technology in educational settings. Findings across 62 articles (1978-2015) have identified the areas most pertinent to technological use as (a) multitasking, (b) socioemotional health, (c) performance, and (d) academics. The review showed an overall negative effect due to the multitasking behavior that tends to accompany technological use, with the exception of education which showed a positive effect when used by teachers to accompany a lesson and a negative effect when used by older students in the classroom as a method of distraction from coursework. Recommendations for more systematic and rigorous research are provided to parallel the growing technology-based education movement.

AH-11

Name, Major: Keelee McCarty, Biochemistry

Project Name: *Public knowledge and trust perceptions for organizations that communicate about agriculture and the environment*

Faculty Advisor, Department: Quisto Settle, Agricultural Information Science & Education

Project Type: Poster

Project Category: Arts and Humanities

Abstract: Organizational communication of agriculture and the environment in government administrations, activist groups, news agencies, and non-profit organizations all participate in the knowledge-sharing community. Components of effective communication hinge on trust and credibility of these organizations and their relationship with the public. To understand where the public places their trust, communicators must identify the kind of information being researched and current topics of discussion. A national survey of the American public was implemented to record awareness and knowledge of various agencies, importance of current issues, and likelihood to pay attention to them in the news/media. Some of the administrations evaluated were governmental agencies, non-governmental, non-profits, community based, and privately owned businesses. Results showed that the public were most aware of governmental agencies (FDA at 94.3%, USDA at 91.4%, EPA at 87.3%), but not as knowledgeable (40.6%, 34.0%, and 30.7% respectively). In terms of trust, smaller organizations (Extension, HSUS, WWF, and EWG) were overall ranked as the most trustworthy on a scale of one to five, five being most trustworthy. Prevalent issues in today's society such as agriculture, the environment, food safety, nutrition, and animal welfare were ranked on importance and the likelihood to pay attention to an issue on a scale of one to five, five being most important. Food safety (4.79) was considered to be the most important issue while the environment (4.56) and animal welfare (4.49) were topics seen as the least important. When compared to the likelihood to pay attention, all of the topics except agriculture remained somewhat the same (mean value above 3.99). In conclusion, the data revealed that smaller, lesser-known organizations are more efficient in sharing knowledge and being considered trustworthy compared to larger administrations. While there is a contrast between what the public deems as important and what issues they would actually pay attention to.

PSE-19**Name, Major:** Lorianne McClellan, Aerospace Engineering**Project Name:** *Aeroelastic Wind Tunnel Test System***Faculty Advisor, Department:** Manay Bhati, Aerospace Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: This paper discusses the process of building a wing designed to be used in the wind tunnel to demonstrate the aeroelastic phenomenon called flutter. Mississippi State University's Aerospace department has an aeroelasticity and structural dynamics course that teaches how to model flutter in a mathematical program. It is desired to support this course with a visual demonstration of the principals being taught. Therefore, a setup is developed for the wind tunnel to demonstrate and document the flutter phenomena. This setup will enable comparison of computer program based research in aeroelasticity with experimental results. This will be useful to research done by professors and students in the department. An example of the research it will aid is research into using trailing edge devices to mitigate flutter. The first step to building this system is to identify a configuration which will flutter at speeds attainable within the available wind tunnel. This is accomplished through use of a Matlab program that uses the finite element method to evaluate a structure's flutter speed and flutter modes when given dimensions and stiffness for the structure. The system will be constructed from aluminum and hot wire cut foam. The final product will then be tested in the wind tunnel to determine if it can be used to perform research into flutter mitigation devices

BSE-32**Name, Major:** Daniel McClung, Biological Engineering**Project Name:** *Characterization of the Putative Oxygen Sensor DosP in Listeria monocytogenes***Faculty Advisor, Department:** Janet Donaldson, Biological Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: The food-borne pathogen *Listeria monocytogenes* is the causative agent of listeriosis and has a mortality rate of 20-30%. *L. monocytogenes*'s ability to survive following exposure to biological stressors encountered throughout the gastrointestinal tract, such as acidic conditions, hypoxic conditions, and bile, is critical for the establishment of listeriosis. Recent work indicated that certain strains of *L. monocytogenes*, such as F2365, have an enhanced ability to resist stressors when exposure occurs under anaerobic conditions. It is hypothesized that the ability to sense oxygen availability can influence the stress response of *L. monocytogenes*. In this study, the putative oxygen sensor, DosP, was tested to determine whether this protein was involved in stress survival by regulating metabolic pathways, cell invasion potential, and overall cellular function. The *dosP* gene was removed from the *L. monocytogenes* 4b strain F2365 and confirmed through gene sequencing. The impact of *dosP* on cellular invasion potential was determined through using human colon cell line C2BBE1, which is a clonal cell line of Caco-2. F2365 and the isogenic *dosP* mutant were cultured overnight in tryptic soy broth in either aerobic or anaerobic conditions. C2BBE1 cells were then infected with F2365 and the *dosP* mutant at a MOI of 1:100 for 1h. Cells were lysed and intracellular bacteria were plated to determine intracellular survival. The data indicated that F2365 invaded uniformly at 0.03% between both aerobic and anaerobic conditions. However, the *dosP* mutant displayed variation between aerobic and anaerobic conditions, with an increased invasion potential of 0.1% under aerobic conditions compared to 0.03% under anaerobic conditions ($P < 0.007$). The intracellular proteomic expression of *dosP* in comparison to the wild type strain indicated that this protein is involved in regulation of various metabolic processes. Further research is needed to determine the function of this protein in the progression of listeriosis.

BSE-33

Name, Major: Lucian McDonald, Wildlife & Fisheries Science

Project Name: *Webster's Salamander (Plethodon websteri) Occurrence in Legion State Park, Winston County, MS*

Faculty Advisor, Department: Jeanne Jones; Wildlife, Fisheries, and Aquaculture

Project Type: Poster

Project Category: Biological Sciences and Engineering

Abstract: Decline of amphibians has been linked to ecosystem diversity and integrity in forest ecosystems. Species, such as Webster's salamander (*Plethodon websteri*), that require natural, mature forest conditions are often imperiled due to the loss of these forest types in Mississippi. Webster's salamanders are rare salamanders indigenous to mature hardwood forests that occur in ravine and terraced topographic conditions. Closed overstory canopy, abundant downed logs and deciduous leaf litter, and underlayment by rocky parent materials may be important habitat characteristics for this species. Because mature deciduous forests are rare and fragmented in Mississippi, information on forest locations and conditions that support these salamanders is needed for conservation planning. We investigated occurrence of Webster's salamanders in hardwood forest ravines of Legion State Park, Winston County, MS. We established drift fence arrays in four locations surrounding a salamander nursery area and conducted nocturnal counts of individuals detected climbing fencing materials during March – April 2015. We detected 186 individual salamanders during 20 hours of surveys over 8 nights which resulted in a detection rate of 6.8 salamanders per sampling hour. Of the 186 salamanders detected, 56% were adults, 26% were 2nd year age class, and 18% were young-of year age class. Of the total number of adults detected, 72% were female, 23% were males, and 5% were undetermined. Data collected from this study will be analyzed to provide a better understanding of seasonal movement of Webster's salamanders and will be used in conservation planning for this salamander species in Legion State Park and statewide.

BSE-34

Name, Major: Jonathan Miller, Biological Engineering

Project Name: *Experimental Quantification of Infant Head Biomechanics for Diagnosing Shaken Baby Syndrome*

Faculty Advisor, Department: Wilburn Whittington, Mechanical Engineering

Project Type: Poster

Project Category: Biological Sciences and Engineering

Abstract: Shaken baby syndrome is a type of traumatic brain injury that occurs when an infant is violently shaken, which can result in permanent brain damage or death. There is currently no conclusive method for accurately diagnosing shaken baby syndrome. The lack of a confident and established diagnostic method has had a significant effect on how defense attorneys and prosecutors use medical evidence in court cases involved with shaken baby syndrome. Establishing a more conclusive diagnostic method requires further understanding of the mechanical properties of brain deformation. This research presents experimental data that helps quantify the mechanical behaviors of infant brain, skull, and scalp tissue when subject to deformation at high strain rates. Fetal pigs were used to obtain the tissue samples, and each sample was tested using a split-Hopkinson pressure bar (SHPB). SHPB tests were performed between strain rates of 500 s^{-1} and 1000 s^{-1} to generate a stress-strain curve for each sample. This data will be used to create computer simulations that can model the deformation of an infant head under various types of head injuries.

PSE-20**Name, Major:** Igor Kevin Mkam Tsengam, Chemical Engineering**Project Name:** *Lipase Catalyzed Esterification Reaction in 3D printed Microreactors***Faculty Advisor, Department:** Kundu Santanu, Chemical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Lipase Catalyzed Esterification Reaction in 3D printed Microreactors The biocatalytic synthesis of esters using Novozyme 435 as catalyst in microreactors fabricated using 3D printing technology has been investigated in this research. Esters are organic compounds with characteristic pleasant scent; hence, esters have commercial significance in the cosmetics, food and pharmaceutical industries. Microreactor technology allow for the synthesis in small volumes of compounds at a relatively shorter period of time compared to batch systems. Additionally, only a very small amount of catalyst is required when using microreactors. The use of 3D printing technology for the fabrication of microreactors allows for easily reproducible polymeric microreactor prototypes compared to the more common types made of glass. The microreactors have been designed with Invent Cubify, a CAD software and printed using the Bukobot 3D printer. Novozyme 435 is a commercially available immobilized catalyst that is used for the synthesis of methyl hexanoate and methyl octanoate. The reactions were first conducted in a batch system to determine the reaction kinetics. Gas chromatography has been used as method of analysis for the ester. The flowrates and reactants concentration will be varied until optimal conversion is achieved in the microreactors. A comparison of the optimal conversion in the batch and microreactor will be established.

BSE-T14**Name, Major:** Kellie Mitchell, Biochemistry**Project Name:** *Altered clock gene oscillations in cardiac fibroblasts from obese and diabetic mice***Faculty Advisor, Department:** Yuhua Farnell, Biochemistry & Molecular Biology**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: It is recognized that organisms use endogenous bodily rhythms to guide physiology and behavior. The circadian rhythm exists not only in the master pacemaker located in the suprachiasmatic nucleus (SCN) of the brain but also in peripheral tissues. This rhythm is disrupted in pathologies like diabetes, which may have serious effects in both the SCN and peripheral tissues. Objective While evidence exists for circadian perturbation of the SCN in diabetes, more research is needed on circadian function in peripheral tissues in healthy and pathophysiological states. Thus, we examined the rhythms of core clock genes Period (Per1, Per2), Bmal1, and Cryptochrome1 (Cry1) in primary cardiac fibroblasts isolated from diabetic (DB; with nonfunctional leptin receptor) mice with nondiabetic (WT) littermates as controls. Methods Primary cultures of cardiac fibroblasts were isolated from DB and WT mice and maintained in 25 mM glucose (hyperglycemic-HG; diabetic db/db) media or 5 mM glucose (normoglycemic-NG, nondiabetic db/wt) media. After growth, the cells underwent serum shock for 2hrs and were harvested at 4-hour intervals for 28hrs for subsequent analysis of Per1, Per2, Cry1, and Bmal1 mRNA levels by quantitative PCR. Results Significant differences in clock gene oscillations between WT and DB mice were observed. Per1, Per2, and Bmal1 mRNA expression oscillated with a similar phase in both WT and DB groups, but different amplitudes. The DB group was distinguished by altered rhythms in the expression of the Cry1 gene within cardiac fibroblasts. In addition, the peak expressions of Per1, Per2, Cry1, and Bmal1 were strongly damped in the cells from DB mice compared to WT mice. Conclusions These results demonstrate altered clock gene expression in primary cardiac fibroblasts from DB mice without functional leptin receptors, suggesting that leptin may operate to regulate clock genes in peripheral tissues such as the heart.

AH-12

Name, Major: Hannah Monroe, Human Sciences (Interior Design)
Project Name: *Historical Decorative Arts Inventory and Examination*
Faculty Advisor, Department: William Riehm, Interior Design
Project Type: Poster
Project Category: Arts and Humanities

Abstract: This research project, conducted over the past summer of 2015, was to observe and provide assistance to the exploration and documentation of antebellum decorative arts in Columbus, Mississippi, being conducted by the Classical Institute of the South (CIS). The goal of the work of the CIS in Columbus was to collect data on furniture, portraiture, and decorative arts, and this research shows the results of this work. Work shown here includes cataloging and describing specific items such as a credenza and side table which includes the date they were approximately made, their provenance, and a very detailed physical description. While this may seem, on the surface, a simple process, it required the attendance of a two-day intensive training program that included lectures on decorative arts, the general work of the CIS, portraiture, and histories of Columbus and other areas researched by the CIS. Seminars located in historic homes, The New Orleans Museum of Art, and The State Museum of Louisiana provided for instruction on photographing, identifying, and handling historical artifacts. This training and days spent inventorying on site revealed specifics of certain objects such as silverware and furniture that had specific meaning in Columbus. This poster will show both the process undertaken as well as the resulting analysis of objects that rose to the level of greatest interest.

BSE-T15

Name, Major: Alexis Montgomery, Animal & Dairy Sciences
Project Name: *Effect of antral follicle count on growth characteristics of follicles and concentrations of steroid hormones in follicular fluid of beef cows*
Faculty Advisor, Department: Jamie Larson, Animal & Dairy Sciences
Project Type: Talk
Project Category: Biological Sciences and Engineering

Abstract: The aim of this study was to determine if greater numbers of antral follicles exert a protective/stimulatory effect on the dominant follicle in the ovary. The ovaries of 26 non-pregnant beef cows were ultrasounded to determine antral follicle count (AFC) and then assigned to 1 of 2 groups: 1) low AFC (LAFC), or 2) moderate AFC (MAFC). Ultrasonography exams were then conducted daily to monitor follicular growth of the dominant follicle and they ended after 4 days of follicular dominance. The follicular fluid was aspirated for analysis of concentration of estradiol and progesterone. The MIXED procedure of SAS was used for data analysis; LSM means and SE are reported. There was no effect of AFC on average growth rate of the dominant follicle; however, the final diameter of the dominant follicle in MAFC females tended ($P = 0.0579$) to be greater than in LAFC animals (12.91 ± 0.33 and 12.09 ± 0.29 mm, respectively). The concentration of estradiol was greater ($P = 0.0436$) in follicular fluid from MAFC than in LAFC cows (830.21 ± 255.39 and 568.70 ± 134.59 ng/mL, respectively). Progesterone also tended ($P = 0.0755$) to be greater in follicular fluid from MAFC compared to LAFC cows (152.21 ± 46.90 and 101.49 ± 24.63 ng/mL, respectively). The ratio of estradiol to progesterone in follicular fluid did not differ ($P = 0.4162$) between MAFC and LAFC females. In conclusion, there may be a protective/stimulatory effect of AFC on the dominant follicle, which may be due, in part, to the greater concentration of estradiol in follicular fluid. Further research is necessary to elucidate the mechanism.

BSE-35

Name, Major: Hunter Mooney, Biochemistry
Project Name: *Identification of Maize Proteins Associated with Insect Resistance*
Faculty Advisor, Department: Xueyan Shan, Biochemistry
Project Type: Poster
Project Category: Biological Sciences and Engineering

Abstract: The goal of this study is to identify maize proteins responsible for the resistance to insect-feeding by southwestern corn borer and fall armyworm. Utilizing 2-Dimensional protein gels, the proteins present in the samples of resistant and susceptible plants can be compared. In this way, a differentially expressed protein can be isolated as a potential component in this insect resistance. The goal of this project is to provide a consistent and efficient method for the extraction of the proteins and their analysis on 2-Dimensional gels. Leaf samples from susceptible plants as well as those showing signs of resistance were collected. These samples were ground with liquid nitrogen and stored at -200 C. Proteins from these samples were then extracted using a TCA precipitation method. These protein samples were then analyzed by electrophoresis on polyacrylamide gels. Finally, the samples were analyzed using isoelectric focusing and electrophoresis on 2-Dimensional gels.

PSE-21**Name, Major:** Max Moseley, Industrial Engineering**Project Name:** *Terrorism Risk Assessment and Management Report-Likelihood Assessment***Faculty Advisor, Department:** Hugh Medal, Industrial Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: For this project, we aimed to assess the likelihood of a wildfire pyro-terrorism attack occurring in the United States. Pyro-terrorism is the use of fire—in this case, a wildfire—to inflict damage while also promoting a political ideology. Through a review of activist websites and literature, recent media exposure, and scholarly articles, the study found that enemies of the U.S. have discussed employing such tactics against the U.S. and that additional resources are recommended so that land managers and forestry officials can better combat these attacks. The study also found online tools that could aid individuals or groups who intend to harm the U.S. Our report was delivered to the University of Southern California Center for Risk and Economic Analysis of Terrorism Events, who connected us with administrators from the Department of Homeland Security's Office of Cyber and Infrastructure Analysis. These meetings sought to disseminate our research through proper channels so that it could be read by appropriate officials, and led to additional conversations with the Emergency Management and Response—Information Sharing and Analysis Center and the Bureau of Land Management concerning the security and accessibility of the online tools. This report will hopefully be used to increase land management resources to protect our forests and surrounding communities from a possible pyro-terrorism attack.

PSE-22**Name, Major:** Matthew Murphy, Mechanical Engineering**Project Name:** *Phase Field Modeling of Solidification Microstructure for Additively Manufactured Inconel 718***Faculty Advisor, Department:** Lei Chen, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Additive manufactured (AM) Inconel 718 metals suffer from structural integrity deficiency because of improper cooling rates and temperature gradients. Low cooling rates and high temperature to growth ratios cause continuous Lavis phase particles. A temperature-dependent phase-field model (PFM) to work with the finite-element method (FEM) is developed, for real-time prediction of microscopic nucleation, dendrite growth, and the segregation phase, or Laves phase particles during AM Inconel 718 solidification. The thermal response at the macroscale is modeled using the FEM, which is then fed into the temperature-dependent PFM for simulating the mesoscopic morphologies and phase changes, by solving the PFM equations, as well as the associated elasticity equations, heat equations and diffusion equations using a highly efficient semi-implicit spectral solver. The computational model is calibrated against experimental observations so as to “train” the PFM equations and parameter values in the model, by collaborating with CAVS. The preliminary results show the dendritic growth of AM Inconel 718 during solidification can be predicted by the model. Extensive computer simulations are being conducted to directly link the processing parameters (such as laser power, laser traverse speed, deposit layer thickness and deposition pattern) to the resultant Laves phase morphologies. This provides a means for optimizing the processing parameters for a minimization of undesirable Lavis phase segregation that can greatly enhance the properties of AM Inconel 718 parts.

SS-18**Name, Major:** Mary Catherine Osman, International Business**Project Name:** *Women, Beauty and the Workplace***Faculty Advisor, Department:** Meghan Millea, Economics**Project Type:** Poster**Project Category:** Social Sciences

Abstract: This is the results of my Directed Individual Study: Women, Beauty and the Workplace. It analyzes women and their perceived attractiveness in three sections: general self-confidence, the hiring stage and the post-hiring stage.

PSE-23

Name, Major: Ajinkya Nawarkar, Computer Science

Project Name: *Hexapod Research*

Faculty Advisor, Department: Cindy Bethel, Computer Science & Engineering

Project Type: Poster

Project Category: Physical Sciences and Engineering

Abstract: The proposed research objective was to gain knowledge in the field of robotics through the programming of a six-legged robot, known as a Hexapod, and to integrate sonar sensors onto this robot. As a part of this research, software development was performed using the Hexapod robot for object detection and avoidance using the integrated sonar sensors. The sonar sensors were placed on each of the six legs and the robot was programmed to detect and avoid any obstacles in its environment while navigating through a maze constructed of cardboard boxes. The maze contained multiple objects placed in the environment for the robot to find and avoid. This project poses many significant technical challenges, such as learning to program a robot with six legs and understanding the mobility of such a system, learning to integrate and program an Arduino embedded system to operate with the sonar sensors, detecting and avoiding obstacles in a challenging environment with obstacles. The approach used in this research may transform search and rescue operations in challenging environments by providing maneuverability in challenging terrain with obstacles that the robot must first detect and then avoid similar to what may be encountered in search and rescue types of applications. Preliminary results will be presented at the time of the poster presentation. Measures include number of obstacles detected and avoided and time to complete the task using the sonar sensors and through tele-operation of the robot.

BSE-36

Name, Major: Shannon Overholt, Biological Engineering

Project Name: *Oxidation of Alginate-Fibrin Microspheres for Optimized Degradation*

Faculty Advisor, Department: C. LaShan Simpson, Agricultural & Biological Engineering

Project Type: Poster

Project Category: Biological Sciences and Engineering

Abstract: Medial calcification is when mineral is deposited in the middle layer of arteries, and has been shown to increase the risk for cardiovascular disease. This disease is believed to involve a phenotypic switch of the vascular smooth muscle cells (VSMCs) into bone-forming osteoblast-like cells. This process is influenced by high concentrations of calcium and phosphate, and it has been shown that these factors contribute to a calcification mechanism similar to the process of bone remodeling. This is due to the presence of osteoblast-like cells, osteogenic markers, and osteoclast-like cells in the calcified tissue. Medial calcification is irreversible, progresses with time, and there is currently no therapy to prevent or reverse the calcification. Because of this, there is a need for a therapy that can specifically target the calcified elastin present with vascular calcification. Previous studies by the group have shown that bone-marrow-derived osteoclasts have the ability to demineralize the calcified elastin without changing the properties of the elastin. This study focuses on examining a polymer technique that will be used to deliver these bone-marrow-derived osteoclasts. Encapsulating cells within microbeads allows for site-specific delivery of these cells to the necessary location. A microbead with a faster degradation rate is preferable when delivering cells, therefore a polymer must be chosen carefully. The commonly used alginate microbeads degrade very slowly and release cells more than two weeks after encapsulation. Oxidized alginate-fibrin microbeads have been shown to degrade at a much quicker rate, releasing cells after just four days. For our proposed project, an oxidized alginate-fibrin polymer will be created and examined for the encapsulation of cells including bone-marrow-derived osteoclasts. Specifically, the degree of oxidation will be altered to provide a microbead with the most desirable

degradation properties. Additionally, the microsphere production process will be optimized with regards to the degree of oxidation.

BSE-37

Name, Major: Jada Parish, Chemistry

Project Name: *Enhancement of Interleukin-2 by Cannabidiol Under Low Stimulation Conditions is Mediated by Adenosine Receptors*

Faculty Advisor, Department: Barbara Kaplan, CVM Basic Sciences

Project Type: Poster

Project Category: Biological Sciences and Engineering

Abstract: Cannabidiol (CBD) is a compound derived from *Cannabis sativa*, otherwise known as marijuana. It is generally immunosuppressive and anti-inflammatory. However, we previously observed that CBD suppresses the cytokine, interleukin (IL)-2, when T cells are optimally activated, but increases IL-2 production when T cells are suboptimally activated. The goal of this study was to determine the mechanism by which CBD increases IL-2. CBD does not have an affinity for CB1 or CB2 cannabinoid receptors, but there are studies that have suggested other receptors like adenosine A2A. Therefore, we hypothesize that CBD acts through the adenosine A2A receptor. Using adenosine A2A antagonists SCH58261 and ZM241385, we optimized the culture conditions, including concentrations, solubility and effectiveness. We also examined if they reversed the CBD effect under suboptimal and optimal conditions, and tested if they could affect IL-2 alone. It was found that they blocked CBD-induced IL-2 in response to suboptimal stimulation. However, they did not reverse CBD-induced suppression of IL-2 in response to optimal stimulation. As a control we also showed that the A2A antagonists did not suppress IL-2 by themselves, suggesting that they prevented CBD-induced IL-2 specifically. Currently, we are trying to determine if the expression of A2A receptor is different at optimal versus suboptimal levels as one explanation for why the antagonists block CBDs effects under suboptimal conditions, but not optimal conditions.

BSE-38

Name, Major: Felicia Parish, Biochemistry

Project Name: *Analysis and Identification of Protein-Related Insect Resistance in Maize (*Zea Mays*) Inbred Lines*

Faculty Advisor, Department: Xueyan Shan, Biochemistry

Project Type: Poster

Project Category: Biological Sciences and Engineering

Abstract: The efficient production of maize, *Zea mays*, is a vital aspect to agricultural and economic status. Maize is the primary feed grain of the United States. The importance of this crop is of special interest for research pertaining to increasing efficiency of production and the reduction of costs. The ultimate goal of this research was to present the continual gain of knowledge associated with the biochemical processes affecting maize resistance against insect damage and infestation. This investigation focused on analyzing the similarities and differences among the proteins extracted from insect-resistant maize inbred lines and those with apparent insect damage. The resistant maize inbred lines Mp705 and Mp706 were analyzed in conjunction with insect-susceptible maize lines B73 and Ab24E, respectively. These analyses were conducted by extraction of total proteins from the leaves of both the resistant and susceptible germplasm lines. Total protein extraction was accomplished utilizing a trichloroacetic acid and 2-ME in cold acetone precipitation technique. These total protein extractions enabled for the eventual comparative studies involving 2-dimensional gel electrophoresis. This 2-dimensional analysis exemplified the separation of the proteins based on their respective, individual properties such as isoelectric point and molecular weight. These analyses will be helpful in the future endeavors of research associated with the efficiency of maize production.

AH-T03

Name, Major: Olivier Péloquin, History
Project Name: *New Orleans and the Texas Revolution*
Faculty Advisor, Department: Anne Marshall, History
Project Type: Talk
Project Category: Arts and Humanities

Abstract: The Texas revolution has fascinated Americans for more than a century now, from the epic martyrs of the Alamo to the unexpected victory of San Jacinto. Lost in all the glory and pain are some forgotten actors like the New Orleans Greys volunteers or the land speculators. The "Crescent City" seems to be unjustly left out of the revolutionary scheme that led to Texas independence. What was the role of New Orleans in the Revolution? By looking at newspapers published between 1836 to 1839, official correspondence and numerous secondary sources, the importance of the city in those insurrectional events becomes obvious. The military, economic and social ties to the revolution will be analyzed to get a clear picture of the "Crescent City" ascendance on Texas independence. To get an understatement of the forces at work during the revolution, the debate on the extension of slavery in the new republic will also be presented. By being central to the funding and the war effort, New Orleans was a decisive actor in the success of the enterprise, one that has been forgotten by more classical interpretations.

PSE-24

Name, Major: Reid Pearlman, Chemistry
Project Name: *Organometallic chemistry with applications in organic light emitting diodes (OLEDs)*
Faculty Advisor, Department: Charles Webster & T. Keith Hollis, Organometallic Chemistry
Project Type: Poster
Project Category: Physical Sciences and Engineering

Abstract: The metalation/transmetalation of the CCCKbisKNKheterocyclic carbene (NHC) pincer ligand has proven highly successful for almost every group in the transition metal CCCKNHC pincer complexes. These organometallic compounds show promising potential as engineering materials for the improvement of organic light emitting diodes (OLEDs). The CCCKNHC platinum complexes are of particular interest as they emit blue light, a much needed color for organic light emitting diodes. Organic LEDs are composed of thin films of organic molecules which emit light upon the application of electricity. Organic LED screens boast brighter, crisper displays on electronic devices and additionally they consume less power than conventional light emitting diodes (LEDs) and liquid crystal displays (LCDs). Optimization of the synthetic techniques for preparing compounds has led to simple, reproducible synthetic processes that yield these complexes in high yield.

AH-13

Name, Major: Lauren Peterson, Biochemistry
Project Name: *Petra: The Lost Stone City*
Faculty Advisor, Department: Lori Neunfeldt, Art History
Project Type: Poster
Project Category: Arts and Humanities

Abstract: This research paper includes information about a piece of art donated to the Cobb institute of Archaeology at Mississippi State University. When the piece was received, the item came with little information about the historical aspect of the object. The piece was said to have been of Roman ancestry and made of marble; however, this piece has been researched and traced back to Petra, the Lost Stone City in the modern-day Jordanian desert. The piece is a figure of a head and was possibly attached for some time to something as a funerary or religious offering representing one of two Nabataean gods, Dushara and Al-'Uzza. This research has been done by carefully considering other expositions hosted by other museums, including the American Museum of Natural History and the Glenbow Museum in Calgary, AB. This research includes information about Petra, its peak as a civilization, the indigenous Nabataean people, the physical aspect of the city and its stone, their gods, how they housed the dead, and the fall of the civilization. The piece is made of limestone and dates back to the 1st century AD. Half of the civilization of Petra was destroyed from an earthquake on May 19th 363 AD.

PSE-T04**Name, Major:** Cody Price, Chemistry**Project Name:** *Synthesis of MTSL-Labeled Elastin-Like Proteins for Paramagnetic NMR & EPR***Faculty Advisor, Department:** Nick Fitzkee, Chemistry**Project Type:** Talk**Project Category:** Physical Sciences and Engineering

Abstract: Elastin-Like Proteins (ELPs) have been proposed as a novel drug delivery vector for treating cancer. These proteins aggregate reversibly above a specific temperature, allowing ELPs to be thermally targeted to cancerous tumors. Though proven successful in mouse models, without a molecular understanding of how ELPs aggregate, it remains extremely difficult to optimize these molecules for drug delivery in humans. Our long-term goal is to test the hypothesis that ELP aggregation is non-specific and does not originate at a specific nucleation point. In this project, we have completed the initial characterization of these proteins and begun paramagnetic labeling in preparation for critical EPR and NMR experiments. We successfully purified and expressed seven ELPs according to established methods with purity of ELP40 higher than 99% at a yield of 150mg/L. Using dynamic light scattering and one-dimensional proton NMR we have begun characterization of the temperature-dependent transition in our ELPs. In addition, we have labeled our protein using MTSL, a paramagnetic NMR probe that will help us to monitor protein association. Here, a series of chromatography methods are applied to achieve the MTSL-labeled ELP. Future work will utilize this MTSL-labeled ELP to monitor the extent to which protein interactions occur below the transition temperature.

PSE-25**Name, Major:** Dalton Pruitt, Chemical Engineering**Project Name:** *Development of Fog Water Harvester***Faculty Advisor, Department:** Santanu Kundu, Chemical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: In areas that receive little precipitation but have vast quantities of fog available, fog collection may be crucial to the locals' survival. Fog water harvesters are meshes set up vertically to capture water droplets from fog. The main objective of this research is to develop a fog water harvester. Two different experimental setups were investigated. The experimental set-up includes a controlled humidity chamber prepared from Plexiglass. Stainless steel mesh was used as the fog collector in these experiments. This design will be used to compare the effectiveness of different materials used as the mesh.

BSE-T16**Name, Major:** Gabrielle Rands, Biological Sciences**Project Name:** *The In Vitro Effects of Glucosamine on Equine and Canine Platelet Aggregation and Thromboxane Synthesis***Faculty Advisor, Department:** Robin Fontenot, College of Veterinary Medicine (Clinical Sciences)**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Determine if glucosamine inhibits equine and canine platelet function via a reduction in thromboxane synthesis in vitro. Animals: Eight healthy adult quarter horses and eight healthy walker hounds were used in this study. Animals were not exposed to any medications or vaccines for at least two weeks prior to study initiation. For both species, normal health status was established by detection of no abnormalities on physical examination, complete blood count, and serum biochemistry analysis. Procedures: Equine and canine blood was collected into 3.2% sodium citrate for assessment of platelet function and thromboxane B2 synthesis. To create platelet-rich plasma, whole blood was centrifuged and the supernatant was collected. Prior to assessment of platelet function and thromboxane B2 synthesis, platelet rich plasma was incubated with one of three concentrations of glucosamine 1 µg/ml, 10 µg/ml, and 100 µg/ml or a control (sterile water). After a five minute incubation period, platelet function was evaluated in triplicate with turbidometric aggregometry using ADP or collagen as agonists. The thromboxane B2 concentration was measured using an enzyme immunoassay. Results: In horses, at all glucosamine concentrations, there were no significant differences in the maximum amplitude, for ADP and collagen, and for thromboxane B2 concentration. In dogs, when ADP was used as the agonist, there was a significant increase in the maximal amplitude between the control and 100 µg/ml ($p=0.0013$) and 1 µg/ml and 100 µg/ml ($p=0.024$). There were no significant changes in amplitude when collagen was used as the agonist and for thromboxane B2 concentrations. Conclusions and Clinical Relevance: The results of this study suggest that in vitro incubation with glucosamine does not have an anti-platelet effect on platelet aggregation or thromboxane synthesis in horses and dogs, even though there was an increase in platelet function at the highest, clinically irrelevant dose. Therefore, the results of this study suggest that glucosamine can be used in horses and dogs without causing inhibition of platelet function.

AH- 14**Name, Major:** Michael Gregson Reinert**Project Name:** *Historic Costume Research: 1960s Yello Silk Shantung Dress***Faculty Advisor, Department:** Charles Freeman, Fashion Merchandising**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: The importance of archiving historical costume at Mississippi State University is vital to the research needed to add value to our Fashion Merchandising and Textile Development program. Ruth Eckhardt donated a beautiful 1960s yellow silk shantung dress to the department and it called for research. The garments textile is silk shantung, which was seen frequently during the 1960s. What is so intriguing about this piece is that the textile came directly from Vietnam. Silk Shantung is a textured or slubbed polyester fabric from Shantung, China that gives a surface interest that satin does not. With the dress being worn and donated to Mississippi State University by a Mississippi Native, Ruth Eckhardt, it shows how women would conduct themselves in regards to style and the textiles that were prominent during that time. Fashion is such an important role in not only ones daily body routine management procedures but also to the factorial support in how people used visual representation through dress to depict and categorize various current events, psychographics and demographics. With consumption being such a big part of the fashion industry, we realize that emotional attachment to goods is what drives most sales. Historic costume leaves so many clues to stories and scenarios that allow us to understand the past and how dress impacted people's everyday life. This garment is a testimony to that and the importance Mississippi State University has in preserving the garment not just for visual aesthetic referencing for young designers but also historians looking to understand the thought process of those living during various eras.

BSE-39**Name, Major:** Brittany Rhea, Agronomy**Project Name:** *Yield Increase in Response to Pruning Young Corn Plants***Faculty Advisor, Department:** Brian Henry, Plant and Soil Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: This research project documents a yield increase in response to pruning young corn plants. Normally, injury to plants would cause a yield decrease. We have noticed a yield increase in some hybrids that have been injured at an early growth stage. There is no known explanation for this phenomena. We believe that the yield increase is hybrid specific, so we used six DeKalb corn hybrids in this trial to document the change in yield of each one. The plants were pruned at an early growth stage (V3) with a weed-eater at ground level. All hybrids were planted on the same date and treated with a split application of 200lb of nitrogen fertilizer. The injured plants matured approximately a week later than the untreated plants. Hybrid DeKalb 62-08 yielded higher after pruning than the untreated plants. Now that we have documented which hybrid has a higher yield, we want to know what is going on inside these injured plant to cause a yield boost. We cannot tell farmers to mow their plants to increase yield because of the time and risk involved with cutting down a crop. If we can figure out what is triggered within this hybrid when it is injured, we can try to create a higher yielding variety.

SS-19 *****Name, Major:** Meg Roberts, Human Sciences (Human Development & Family Studies)**Project Name:** *Life After College: Preparedness in College Seniors***Faculty Advisor, Department:** Joe Wilmoth, Human Sciences**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Today's Millennials are graduating from high school, graduating from college, and entering the workforce with only the knowledge that they have acquired from their school studies. This research study analyzes the preparedness of graduating college students entering the workforce. Aims/Goals The goal of this study is examine if college seniors feel prepared toward graduating and entering such a competitive business world. We conducted a survey for our classmates to test this. The survey consisted of four simple questions. According to Francis-Smith in the article *Surviving and Thriving in the Multigenerational Workplace*, "This group was born into a world of advanced technology, and learned to master technology at a young age, developing a highly developed skill for multi-tasking." (Francis-Smith, 2004, p. 2) That is more than beneficial in our world today since everything revolves around technology. Henscheid, on the other hand, writes in the article *Preparing Seniors for Life After College* that they have "trouble thinking critically, managing uncertainty, and directing their behaviors..." (Henscheid, 2008. p. 20) Methods The first question within the survey asked, "Are you graduating this year?" The second question asked, "Do you have an job or internship lined up after graduation?" The third and fourth questions asked, "Do you feel stressed about the future, and if so why?" and "Do you feel that Mississippi State has prepared you for your future goals?" Overall, the majority of the survey participants, though uneasy, did feel prepared for life after graduation. Analysis and Implications The research proved that there is most definitely potential for future success in graduating college students, but in order to achieve that success colleges are going to have to start implementing more/better programs, such as St. Louis University's "Disorientation" program, to assist college seniors in learning such things as etiquette and drive for their workforce.

BSE-40**Name, Major:** Bryan Robinson, Aerospace Engineering**Project Name:** *Computational Fluid Dynamics within Aorta***Faculty Advisor, Department:** Shanti Bhushan, Mechanical Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Computational fluid dynamics (CFD) has emerged as a reliable tool to investigate biofluid structures and aid in designing cardio-vascular devices. The primary objective of this study is to perform turbulent simulations of blood and particulate (in particular thrombi) flow in mammal aorta, to evaluate the probability of thrombus localization (thromboembolism) for hypertrophic cardiomyopathy (HCM) heart conditions. To achieve the objectives one-way, two-way, six-way, and inter-particle coupled simulations were performed for particle transport in aorta using commercial software Ansys/FLUENT. The research was performed in collaboration with PhD student, Mr. Manish Borse, and the preliminary research includes: (a) blood flow simulations within feline aorta using Ansys/Fluent; (b) blood and particulate transport simulations using two-way coupled Eulerian-Lagrangian model; and (c) analysis of particle deposition pattern, including an exploratory study to understand the effect of particle size, ranging from 20-50mm. Research for the spring of 2016 focused on: (a) detailed analysis to study the correlation between the particle diameter and the momentum forcing on the deposition pattern; and (b) additional simulations using four-way coupling. The four-way coupled simulations were compared with previous two-way coupled results, to study the effect of particle-particle dynamics on deposition pattern.

BSE-41**Name, Major:** Benjamin Rushing, Biological Engineering**Project Name:** *ECA Hydrochlorous Acid Derivative as a Cell Culture Antiseptic***Faculty Advisor, Department:** Steve Elder, Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: ECA Hypochlorous Acid Derivative as a Cell Culture Antiseptic Eukaryotic cell cultures are a common component of biomedical research; consequently, the success of many experiments hinges upon successful cell cultivation. Contamination is the most common problem encountered. Hypochlorous acid is known to possess antiseptic properties and has long been used in wound treatment to limit infections. The purpose of this study is to determine the antiseptic properties of an electrochemically activated (ECA) hypochlorous acid derivative and to observe the effects of this treatment in cell cultures. The antiseptic properties of the ECA hypochlorous acid derivative will be tested by exposing bacteria solutions to treatments of varying concentration and time. Afterwards, human knee cells will be infected with bacteria and treated with the ECA hypochlorous acid derivative to observe cytotoxic and antiseptic properties. The knowledge gained in this study could help researchers who rely on cell cultivation to avoid contamination of cell cultures.

PSE-26**Name, Major:** Will Russell, Mechanical Engineering**Project Name:** *Material Challenges in Laser-Based Additive Manufacturing***Faculty Advisor, Department:** Scott Thompson, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Additive manufacturing, or '3D printing', is an up-and-coming process for producing complex parts from a variety of powdered metals. With additive manufacturing, parts are fabricated layer-by-layer using a laser. At Mississippi State University's Center for Advanced Vehicular Systems, research is being conducted using laser-based systems such as: Laser Engineered Net Shaping (LENS) and Selective Laser Melting (SLM). During LENS, powder metal is injected as the laser fuses the part, while SLM parts are fused together 'selectively' after a bed of powder deposited. Additive manufacturing provides a means to produce many metals and alloys; however, the correct process parameters for many metals are unknown. Hence, the past semester was spent assessing the feasibility of 'printing' various metals and non-metals using LENS, including copper and magnesium alloys, alumina and silica. Copper is a valuable metal for its high thermal and electrical conductivity. However, these traits make it difficult for the copper to retain heat, resulting in poor laser penetration. Magnesium has low density which makes it popular within the aerospace and automotive industries. Magnesium can react with water and has the potential to combust in presence of oxygen when in powder form. Ceramics like alumina and silica can be used in integrated circuits as semi-conductors which could revolutionize how circuits are shaped and incorporated in final packaging schemes. The successful LENS process for copper is most-likely consist of two lasers – with a 'pre-heating' laser trailed by a 'processing' Nd:YAG laser. Safety precautions for handling magnesium before, during and after LENS were assembled and consist of methods for reducing spontaneous combustion. Determining the next line of materials for processing can significantly expand the horizons of engineering design and manufacturing. Once materials like copper, magnesium, and ceramics can be 'printed', there will be less limitation in what can be imagined or produced.

PSE-27**Name, Major:** Kaitlyn Sabourin, Geoscience**Project Name:** *Microbial Mat Analysis***Faculty Advisor, Department:** Brenda Kirkland, Geology**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: The objective of this study is to determine the volume and nature of mineral precipitation in a microbial mat collected in 2009 in Brazil from the Lagoa Vermelha salt pond, a shallow, hypersaline lagoon located on the coast, 100 km east of Rio de Janeiro. The bottom of the lagoon is characterized by a layer of microbial mats; laminated communities of prokaryotes. Visual assessment of photos taken at the field site in 2009 compared to photos show that the percentage of precipitate has increased significantly. ArcGIS and Photoshop software were used to determine that the amount of mineral precipitation present in the microbial mat is 7.72%. SEM images confirm the increase in precipitate. The SEM images from 2009 show little to no precipitate and abundant organic matter. Images of the mat taken with petrographic microscope and SEM confirm that the volume of precipitate has increased. This research is important because it broadens our understanding of the relationship between microbes and their mineral precipitate, and has potential applications to biotechnology, aquaculture, bioremediation, medicine, and astrobiology.

PSE-28**Name, Major:** Shuyam Saha, Aerospace Engineering**Project Name:** *Wearable two-layered Super Capacitor***Faculty Advisor, Department:** Lei Chen, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: A multi-scale, two-layer electrode model to design fabrication method to improve the energy and power density up to several times as compared to conventional wire super capacitors is developed. Through this model several performance elements of this kind of super capacitor can be analyzed and its effectiveness can be proved. The study shows current problems of traditional fiber super capacitors being low effective contact surface area, technically more challenging to precisely control layer-by-layer assembling, conductivity and flexibility. Advantage of using this model is that it is small in size, light in weight, and highly flexible. The co-axial configuration also structurally stabilizes upon bending. However, it is technically more challenging to control precisely the layer by layer assembling of multiple layers of small diameters. Comsol Physics software has been used to create the geometry and run simulations on it to analyze performance data. The analysis so far has shown that the specific capacitance tends to decrease with an increase in current density. This study provides valuable information on increasing effectiveness of wearable super capacitors which, will help in advancing technological devices relying on energy storage.

PSE-29**Name, Major:** Erik Sanchez Antonio, Chemical Engineering**Project Name:** *The Effects of Mucus Coupled with PEG Functionalized Gold Nanoparticles***Faculty Advisor, Department:** Keisha Walters, Chemical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Mucus is a complex bodily fluid that works to protect various organs and tissues within the body. It forms layers that control the flux of materials from the surrounding environment to the body, primarily in the respiratory system. Due to the complexity of the fluid, it presents a difficult challenge to penetrate and deliver certain desirable drugs due to the inherent qualities that are still not wholly understood. In this study, the interactions of mucus with and without functionalized nanoparticles are examined. The Au nanoparticles are functionalized with PEG polymer, and its interactions will be examined at the micro and macro level to better understand future nasal/lung drug delivery methods.

SS-20 *****Name, Major:** Audrey Sanderson, Elementary Education**Project Name:** *Professional Development to Support Familiarity and Use of Instructional Strategies in the Middle Level Classroom***Faculty Advisor, Department:** Kathleen Alley: Curriculum, Instruction, and Special Education**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Professional Development to Support Familiarity and Use of Instructional Strategies in the Middle Level Classroom Audrey Sanderson This study investigates the influence of an intensive, month-long teacher institute on participants' familiarity with and use of research-based instructional strategies. SSILTT: Science and Social Studies Integration with Literacy and Technology was a professional development program for middle level educators that took place in June 2014, with two follow up sessions provided during the 2014-2015 school year. Workshop goals were to help teachers: (1) increase academic rigor and their use of CCSS to design instruction in literacy and in the content areas, including the infusion of research-based instructional strategies, (2) increase students' use of argument, critical thinking, listening and speaking, and writing skills required for the CCSS, (3) increase teachers' use of technology, including multimodal and visual literacy, and (4) create developmentally responsive learning environments and classroom-based interventions that foster deep thinking and problem-based learning experiences, promoting motivation at the middle level. Quantitative and qualitative methods were used to investigate participants' familiarity with and use of research-based instructional strategies. Data sources I used in this investigation included an instructional strategy questionnaire of teachers' knowledge of instructional strategies, given pre and post intervention; and, transcriptions of focus group discussions conducted during the June institute and follow up sessions. Statistical analysis indicated there was a significant difference in participant familiarity with strategies before the training and after. Paired-samples t-test results comparing participant self-reported use of strategies before the training and after were significant. Qualitative analysis of transcribed focus group discussions supported quantitative analysis, indicating teachers felt the professional development they received supported their increased familiarity with instructional strategies they then included more frequently when planning for and implementing instruction. Further, teachers stated they believed their increased use of these instructional strategies supported students' academic achievement.

PSE-30**Name, Major:** Satia Sanyam, Computer Sciences**Project Name:** *Symbolic LAO****Faculty Advisor, Department:** Eric Hansen, Computer Science & Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Markov Decision Processes (MDPs) are used to model a wide range of problems that require planning and decision-making under uncertainty. Traditional algorithms for solving MDPs suffer from the "State Explosion Problem". In this project, we combine a heuristic search algorithm, LAO*, with memory-efficient data structure called multi-terminal binary decision diagrams, to form a "Symbolic LAO*" algorithm. Symbolic LAO* can efficiently handle problems with a very large state space. The algorithm is tested on benchmark problems from the fields of probabilistic planning and probabilistic model checking.

PSE-31**Name, Major:** Avery Schemmel, Mechanical Engineering**Project Name:** *Smart Building with Wireless Sensor Network***Faculty Advisor, Department:** Alta Knizley, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: This project focuses on the implementation of a wireless sensor network (WSN) for the purpose of transforming conventional buildings into smart buildings with a centralized, intelligent energy management system via smart grid technology. These “smart” technologies are quickly becoming a vital component to an increase in energy-efficiency while also maintaining an environmentally-friendly solution to standard building design. In this project, wireless sensors and a communication network have been developed and implemented in campus buildings to measure, monitor, and analyze building energy and performance data. A literature survey was performed to understand the building physics and energy components and to identify key measurements that are required to enable smart building technologies. Various wireless sensors along with the communication network were developed using open-source computer hardware and software. The key features of the wireless sensor network include a low build-cost and a plug-and-play capability as well as the ability to compile data from a range of sensors that can span multiple rooms to a single, centralized point. After implementations in a campus building, data collection and uncertainty analysis were performed. Integrating a WSN into buildings makes use of a mixture of digital and analog signals that are collected, interpreted, and processed by our range of sensors (CO₂ sensors, photodiodes, current sensors, relative humidity sensors, and temperature sensors), and our Arduino microprocessor. By collecting environmental data, electrical and thermal load profiles can be correlated with the data which could lead to advanced controls to optimize cost and efficiency of building operation.

BSE-42**Name, Major:** Aumbriel Schwirian, Biochemistry**Project Name:** *Evidence of Multiple Paternity in *Cyclura nubila caymanensis****Faculty Advisor, Department:** Mark Welch, Biological Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Inbreeding depression is often severe in small populations because the enhanced effects of genetic drift increase the likelihood that deleterious alleles will be expressed. *Cyclura nubila caymanensis*, more commonly known as the Sister Isles Rock Iguana (SIRI) is a critically endangered taxon endemic to two of the Cayman Islands: Cayman Brac and Little Cayman. Little Cayman has the larger of the two populations, approximately 1500 individuals and is potentially the only viable population of iguanas. Despite Little Cayman having fewer human inhabitants than Cayman Brac, the iguanas still face threats from habitat destruction, introduced feral predators, and livestock. Due to its small population and therefore limited gene pool, inbreeding depression may be a significant long-term conservation concern for the taxon. It has been postulated that in naturally small isolated populations, inbreeding avoidance strategies such as polyandrous or nonrandom mating may evolve to optimize outbreeding when close kin cannot be distinguished. Female iguanas are capable of storing sperm from multiple males, which could result in half-sibling progeny arrays possessing higher genetic diversity than full-sibling clutches. We hypothesize that there will be high rates of multiple paternity among SIRI females on Little Cayman because the population is expected to be severely inbred. Rates of multiple paternity can be determined by exclusion probability analysis given maternal and hatchling DNA samples. Multilocus microsatellite genotypes were assembled using PCR and Genemarker automated scoring software and GERUD 2.0 was used for sibship analyses. Preliminary analyses of 15 hatchling cohorts detected high incidence of greater than two minimum sires, indicative of multiple mating behavior. This finding is significant because it suggests a possible evolutionary response by a small and isolated population to the inherent selection pressures of inbreeding depression.

BSE-43**Name, Major:** Ashley Shannon, Wildlife & Fisheries Science**Project Name:** *Speckled king snake coloration in relation to soil value and chroma***Faculty Advisor, Department:** Scott Rush; Wildlife, Fisheries, and Aquaculture**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Speckled kingsnake (*Lampropeltis getula holbrooki*), an obligate predator, exhibit variation in coloration and pattern throughout their range. Drivers behind this variability remain largely unknown. It has been hypothesized that many reptile, including the speckled kingsnake use colors and patterns for communication and concealment while physical characteristics can also constrain or promote this ectotherm's ability to regulate temperature. We sought to evaluate spatial patterns in speckled kingsnake coloration within Mississippi, relating spatial patterns in coloration to ecoregions and a dominant habitat feature: soil class. We determined the proportion of black to white coloration of kingsnakes photographing a cluster of nine dorsal scales of (n= 78) specimens collected from 45 Mississippi counties. Image analysis of these photographs was used to determine the ratio of light to dark coloration within these scales for each snake. We found the proportion of white coloration to black coloration gradually decreased in populations in the northeastern part of the state with individuals with higher ratio of white to black found in counties along the Mississippi Delta and Gulf Coast. Average soil value and chroma was determined for the dominant three soil classes of each county from which a snake specimen had been collected. A negative relationship was determined between soil value ($\beta = -4.73$, st. dev. = 1.99, $P = 0.02$) and chroma ($\beta = -3.35$, std. dev. = 1.53, $P = 0.03$) and the proportion of white to black on measured kingsnakes yet variance explained was low ($R^2 = 0.05$). These results suggest that speckled kingsnakes have adapted their physical appearance with color and chroma of soils in their ecoregion, possibly in response to ectothermic relationships.

BSE-44**Name, Major:** Christian Shirley, Wildlife & Fisheries Science**Project Name:** *Effects of Proposed Length Limit Changes & "5 under rule" on Lake Washington Crappie Populations and Harvest***Faculty Advisor, Department:** Michael Colvin, College of Forest Resources**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Lake Washington is a very popular lake for Black and White Crappie. In recent years different angler groups have started asking for an increase in regulations. Last year, 595 anglers signing a petition stating that they wanted an increase in the minimum length limit from 10 inches to 12 inches, because of a perceived decrease in harvest rates and average weight. MDWFP has done creel surveys over the past 20 years and have found that harvest rates and average weights have remained relatively the same. An interesting component of this fishery is a rule that allows anglers to keep 5 fish that are under the current length limit, known as the "5 under rule". In order to evaluate a potential length limit change we collected lengths, weights, and ages from 216 crappie. Crappie were harvested with the use of trap and led nets. Otoliths were pulled and taken to Mississippi State and aged using a microscope. Once all of the data was collected we formed a length-weight relationship ($W=a*\text{Length}^b$) with the parameters of $a=5.80436E-07$ and $b=3.614829$. We also formed a von Bertalanffy growth function ($L(t) = L_{\infty} * [1 - \exp(-K*(t-t_0))]$) with the parameters of $L_{\infty}= 343.9743$, $K= 0.395465$, and $t_0 = -1.02557$ to give us a growth curve. Once these parameters were established we used Fisheries Resources Analysis System to produced models that let us look at yield of the lake for a minimum length limit of 10, 11, 12 inches and with a variety of conditional fishing mortalities under the minimum length limit to see how the "5 under rule might affect yields.

SS-21

Name, Major: Anna Smith, Psychology

Project Name: *Caregiver Depression and Childhood Injury Rates*

Faculty Advisor, Department: Danielle Nadorff, Psychology

Project Type: Poster

Project Category: Social Sciences

Abstract: Parental depressive symptoms have been found to be associated with increased child injuries. Previous research has indicated that social support and domestic conflict may be more responsible for children's safety risks. However, most research has been focused on prevention practices, not actual child injuries, thus resulting in limited data. The current study expanded the existing research by studying how depressive symptoms in custodial grandparents and foster parents affect child injury rates. In addition, this study evaluated if caregiver status, caregiver gender, or child gender moderated the relation between caregiver depressive symptoms and child injury rates. A sample of 399 custodial grandparents and 172 foster parents completed an online survey where they reported depressive symptoms via the CES-D, and the major and minor injuries of their child. Our results indicated a significant positive correlation between caregiver depressive symptoms and both major and minor child injury rates. Also, child gender moderated the relation between caregiver depressive symptoms and major child injuries. Caregiver depressive symptoms were predictive of injuries for male, not female children. The remaining two hypotheses were not supported. Implications, future directions, and limitations are discussed.

AH-15

Name, Major: Meghan Smith, Psychology

Project Name: *Gender Salience and Rape Myths*

Faculty Advisor, Department: Kristina Hood, Health and Social Psychology

Project Type: Poster

Project Category: Arts and Humanities

Abstract: Rape myths, false beliefs about the culpability of victims, the innocence of rapists, and the illegitimacy of rape as a serious crime (Chapleau, Oswald, & Russell, 2008), are an extension of the traditional sexual scripts that emerge from gender role socialization (Millburn, Mather, & Conrad, 2000). Gender salience (GS) can be defined as a cognitive state wherein someone self-defines as a member of their collective gender group (Palomares, 2008). Thus, it is likely that GS may lead to increased rape myth acceptance (RMA). RMA can provide prototypical stories, sexual scripts, which guide behavior (Ryan, 2011). The current study sought to explore how individuals' GS influences acceptance of different rape myths. Undergraduate students ($N=348$) completed an online survey via Qualtrics, which included the Gender Salience Measure, the Illinois RMA Scale, and one question asking individuals to identify their gender. Two hierarchical regressions, both controlling for gender, were conducted to show that GS significantly influenced acceptance of two specific rape myths. Results yielded that GS significantly predicted individuals' acceptance of the rape myth "She was asking for it," $\beta=.10$, $t(2, 346)=2.02$, $p=.04$, such that greater GS was linked to less RMA. This model accounted for a significant proportion of the variance in acceptance of this myth, $R^2=.06$, $F(2, 346)=11.16$, $p<.001$. Results also demonstrated that GS significantly predicted individuals' acceptance of the rape myth "It wasn't rape," $\beta=.22$, $t(2, 346)=4.36$, $p<.001$, such that GS was linked to less RMA. This model also accounted for a significant proportion of the variance in acceptance of this myth, $R^2=.07$, $F(2, 346)=16.14$, $p<.001$. Results, which contradicted our initial hypothesis, imply that the extent to which individuals are aware of their own gender impacts beliefs about sexual assault. These findings can be used in the future to drive education and sexual awareness programs.

BSE-45**Name, Major:** Nathaniel Sparks, Chemistry**Project Name:** *KNOCKING OUT RAP1A GTPASE MAY ALTER INSULIN SIGNALING TO ATTENUATE ONSET OF TYPE 2 DIABETES***Faculty Advisor, Department:** James Stewart, Biological Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Rap1a is a small monomeric G-protein that acts as a molecular switch coupling extracellular events to intracellular signaling. Recent studies have demonstrated Rap1a plays a role in dampening PI3K/AKT/mTOR signaling. This pathway is crucial to insulin receptor signaling and GLUT-4 translocation/recycling. In type 2 diabetes, the insulin receptor cascade uncouples from the PI3K/AKT/mTOR pathway resulting in insulin insensitivity and decreased glucose uptake. Our laboratory has demonstrated Rap1a is significantly elevated in diabetic fibroblasts. The purpose of this study was to identify a role for Rap1a in the PI3K/AKT/mTOR pathway. We hypothesized that knocking out Rap1a expression would prevent PI3K/AKT/mTOR signal depression to attenuate diabetes onset or progression. Observational data revealed, when Rap1a gene deletion (Rap1a^{-/-}) was bred into a diabetic mouse strain, Rap1a^{-/-} diabetic mice did not present phenotypic characteristics of the model. Hearts were harvested from Rap1a^{-/-} and Rap1a^{+/+} for proteins to determine differences in components of the insulin receptor signaling cascade, PI3K/AKT/mTOR pathway, and GLUT-4 phosphorylation. To date, no significant differences have been reported; however, western blot analysis are still being conducted and may reveal differences. Current work is also focused on knocking down Rap1a with siRNA in diabetic and nondiabetic fibroblasts, as well as feeding Rap1a^{-/-} mice a high fat diet to induce diabetes to uncover changes in the signaling cascades.

PSE-T05**Name, Major:** Elizabeth Stafford, Chemical Engineering**Project Name:** *Molecular Layer-by-Layer Assembly of Polyamide Thin Films***Faculty Advisor, Department:** Santanu Kundi, Chemical Engineering**Project Type:** Talk**Project Category:** Physical Sciences and Engineering

Abstract: Polyamide thin films are widely studied for their applications in desalination membranes used to produce clean water. The thin films are currently created through an interfacial polymerization reaction using trimesoyl chloride (TMC) and m-phenylenediamine (MPD). The interfacial polymerization reactions result in rough film surfaces with variable thicknesses. During the desalination process these thin films are prone to biofouling, meaning foulants become trapped on the membranes as the water is filtered. Foulants can be removed using chlorine, but this leads to further degradation of the thin film membrane over time. Current research is focused on improvements to the thin films, specifically incorporating functional materials including nanoparticles that will resist fouling while maintaining the functionality of the thin film membranes. This research is based on the previous work on synthesis of polyamide films using a layer-by-layer approach using the spin-coating technique. A better understanding of the spin coating process on the film thickness and morphology was achieved in this research. Then this research attempted to combine the spin-coating process with a chemical reaction to include graphene oxide (GO) as an additive for the thin film. GO was used because it has been shown to improve biofouling resistance while maintaining water flux and salt removal through the thin film membrane during desalination. Various methods of incorporating the GO in the thin film will be reported.

PSE-T06**Name, Major:** Eric Stallcup, Aerospace Engineering**Project Name:** *The Development of an Inexpensive, High-Velocity Sounding Rocket***Faculty Advisor, Department:** Keith Koenig, Aerospace Engineering**Project Type:** Talk**Project Category:** Physical Sciences and Engineering

Abstract: An emerging interest in the defense industry is flight vehicles capable of achieving supersonic to hypersonic speeds. As other nations continue to improve radar capabilities, it is becoming increasingly difficult to hide low radar cross-section vehicles in the sky. One method of combating this is going faster, as can be seen by the recent tests of the hypersonic X-51 aircraft being developed by Boeing. The goal of this project is to design, built, test, and launch a sounding rocket capable of reaching speeds in excess of Mach 4. It will be tracked electronically and will be fully recovered under parachute. The on-board sensor suite will be used to measure vehicle flight dynamics, including verifying the velocity reached. Similar projects undertaken in industry generally become long and costly. This project is streamlining that process by designing and building a simple, yet reliable, vehicle that can be completed in under a year at a relatively low cost. Naturally, numerous challenges arise in attempting to fly this fast. Skin friction heating, vehicle stability, propellant mass fraction and thrust requirements, and structural integrity under launch and aerodynamic loading are all concerns that are addressed. The development of an inexpensive, high-velocity sounding rocket is progressing rapidly and moving towards a launch in Black Rock, Nevada, in June of 2016. This paper outlines the preliminary research, design, and subsystem testing that has taken place in the effort to make the vehicle flight ready.

BSE-46**Name, Major:** Hannah Stealey, Biological Engineering**Project Name:** *Assessing the Geometric Effects of Shock Tubes for a Mild-Traumatic Brain Injury (TBI) Rodent Model Experiment***Faculty Advisor, Department:** Raj Prabhu, Agricultural & Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: The prime objective of this project is to test variations in the geometry of the shock tube designs that will be used in rodent model mild-TBI experiment. Induced by events such as blast impact of the head or resultant shock waves of detonated improvised explosive devices (IEDs), TBIs are common occurrences in contact sports to the most recent wars. These injuries cause a tremendous physiological, emotional and financial burden on the victims and their families. Currently, a lack of repeated experimental results has caused a lack in understanding in these neurotraumatic events and furthermore a lack of a treatment. To be able to develop a treatment, the situations need to be recreated in a safe, controlled fashion. Experimental devices called shock tubes allow blast waves to propagate down a long shaft (the driving section) that gives the wave time for a realistic wave (Friedlander shock wave) to form. These waves are produced in the driven section after either an explosive, such as C4, detonates or a build-up of gas, such as hydrogen, ruptures a plastic membrane between the driven and driving section. When monitored by pressure sensors placed at the end of the driven section, the most accurate designs show a Friedlander's wave. Using a finite element software (ABAQUS/Explicit), three designs are created and then tested for the shaping of the shock wave form—a tapered rectangular driven section that feeds directly into the rectangular driving section, a tapered rectangular driven section that has a gap before feeding into the rectangular section, and a conical design that includes three cones of the same length with gaps in between cones. 2D models of the three designs are tested, and the design that shows the best Friedlander's shock wave will be tested in a three-dimensional model.

BSE-47**Name, Major:** Kalifa Stringfield, Biological Engineering**Project Name:** *Gene Therapy for Vascular Calcification***Faculty Advisor, Department:** C. LaShan Simpson, Agricultural & Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: A key progenitor of death in America is cardiovascular disease. Vascular calcification, the accumulation of phosphate and calcium substituents, is an integral mechanism of heart disease that can be exhibited in intimal and medial forms. Our research pertains to arterial medial calcification. A characteristic of medial calcification is osteochondrogenic gene expression, the phenotypic transition of vascular smooth muscle cells (VSMC) to osteoclasts. Our study is concentrated on medial vascular calcification in chronic kidney disease patients. A deficiency of Fetuin-A, a liver synthesized serumglycoprotein, is hypothesized to be a principal factor. In vivo studies in mice show that low levels of this protein stimulates soft tissue calcification. Our objective is to treat VSMC with Fetuin-A to illustrate the response of genetic expression in contractile VSMC markers of alpha smooth muscle actin and RUNX2, an osteogenic phenotypic expression synonymous with calcification. Our research uses cultured primary human vascular smooth muscle cells (HVSMC) at 6-8 passage. One independent group consists of HVSMC supplemented with calcification medium from day 0-7. On day 7 Fetuin-A will be added until the duration of the analysis. The next independent group will be supplemented with calcification medium for the entire study and on day 7 will be supplied with Fetuin-A. One control group will consist of HVSMC fortified with calcification medium for 7 days and supplemented with calcification medium for 14 days. Another group of HVSMC are enriched with standard growth medium for 14 days and then the other HVSMC will be supplemented with calcification medium for 7 days and standard growth medium for 7 days. To quantify calcium deposition Atomic Absorption will be used. Bicinchoninic acid assay will determine cellular content by evaluating protein calcification and normalize calcium deposition to cellular protein concentration.

AH-16**Name, Major:** Georgia Swinford, Mathematics**Project Name:** *Divisibility of Binomial Coefficients at $p=2$* **Faculty Advisor, Department:** Russ Woodroffe, Mathematics**Project Type:** Poster**Project Category:** Arts and Humanities

Abstract: John Shreshian and Russ Woodroffe recently asked when binomial coefficients divisible by the prime number p and integer r for a given set of conditions. The original condition given in their paper states that there exist primes p and r such that for all nontrivial binomial coefficients, will be divisible by either p or r . The binomial coefficient counts the number k -subsets that are possible in a set of n distinct terms. With the development of a sieve to test when the condition holds, they noted that the case $p = 2$ is of special interest. The question that arises is for what density of integers n are all the odd number binomial coefficients divisible by an integer? My project was motivated by patterns that I saw in computer-generated examples for values of r that satisfy the given condition and sieve when $p = 2$ for given values of n . A pattern emerged in which I noted down how many generations a given value of r survived. I noticed that if all the odd binomial coefficients of n were divisible by p , then frequently (but not always) the same held for $2n$. Thus, I demonstrated some of the cases where the aforementioned pattern holds true.

SS-22**Name, Major:** Seth Thomas, Psychology**Project Name:** *Isolating goal state retrieval processes from reconstruction processes in interruption-recovery skill acquisition and novel task transfer***Faculty Advisor, Department:** Jarrod Moss, Psychology**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Evidence from prior studies has suggested that time to resume a primary task following an interruption (i.e., resumption lag time) decreased with practice and that the acquired skill transferred between novel task-pairs. In previous studies, it was not possible to determine whether people improved at retrieving their progress on the task after an interruption or whether they got better at reconstructing that progress from environmental cues. Therefore, this experiment was designed to prevent reconstruction so that only memory retrieval was possible. Participants were interrupted while performing Tower of Hanoi or Tower of London problems and their resumption lag time was measured. Interruptions were either two-digit addition or visual matching trials. In order to rule out the possibility of reconstruction, the part of the display showing the goal of the problem was removed when returning from an interruption. By removing the goal display, participants had to retrieve the correct sequence of actions following the interruption from memory instead of reconstructing the actions based on the goal display. The design counterbalanced task presentation such that some groups performed the Tower of Hanoi task in the first trial block (training block) while other groups performed the same task in the second trial block (transfer block). A significant decrease in resumption lag time signified that participants acquired the retrieval skill. Evidence for skill transfer was significantly lower resumption lag time for groups who performed a task-pair at transfer, which followed training on a novel task-pair, when compared to groups who performed the matched task-pair at training. Participants' resumption lags were lower for both task-pairs during the transfer block as compared to the training block. The results led to the conclusion that interruption practice improved the ability to cope with interruptions and assisted in the development of retrieval-based recovery skills that transferred to new tasks.

PSE-32**Name, Major:** Matthew Tidwell, Mechanical Engineering**Project Name:** *Estimation of ignition delay times of diesel fuel combustion in an optically accessible variable compression ratio rig using a pressure-based method and using high-speed natural luminosity imaging***Faculty Advisor, Department:** Kalyan Srinivasan, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: This study focuses on estimating ignition delay times of diesel fuel using an optically accessible Variable Compression Ratio Rig (VCRR) at the MSU Advanced Combustion Engines Lab. The focus of this experimental study was to investigate the nature of diesel combustion at 1000 bar injection pressure with fuel injection durations ranging from 0.5 microseconds to 1.5 microseconds using real-time high speed imaging of natural luminosity (NL) and instantaneous combustion pressure measurements. The major objective of this study was to estimate the ignition delay times of diesel combustion from cylinder pressure measurements and correlate them to NL signals based on the first visual occurrence of the flame. It is generally observed that the pressure-based estimate of ignition delay is less than the NL signal based estimate of ignition delay confirming similar observations in the open literature.

PSE-T07**Name, Major:** Olivia Todd, Chemistry**Project Name:** *Removal of Lead and Cadmium From Wastewater Using Magnetic Rinsed Ultra Bio-char***Faculty Advisor, Department:** Todd Mlsna, Chemistry**Project Type:** Talk**Project Category:** Physical Sciences and Engineering

Abstract: Lead and cadmium are toxic heavy metals that find their way into the environment through industrial and mining waste and from energy production. Unfortunately, these metals have a tendency to bioaccumulate in the environment and are a serious concern because they can have detrimental effects on wildlife and humans at low concentrations. Therefore, it is imperative that they be removed from water. A novel method of heavy metal removal from wastewater is through the use of magnetic bio-char, which is a cheap, environmentally-friendly alternative to the traditional methods of membrane filtration, selective ion exchange, and precipitation. Magnetic bio-char was prepared by iron oxide precipitation onto the surface of commercially available Rinsed Ultra bio-char using an aqueous Fe³⁺/Fe²⁺ solution followed by NaOH treatment. The surface chemistry and composition of magnetic bio-char were examined by SEM, SEM-EDX, TGA, PZC, elemental analysis, and surface area measurements. For both magnetic and non-magnetic bio-char, batch sorption studies were performed at 25- 35°C, pH 2-8 and different solid to liquid ratios. The concentration of the heavy metals was determined using AAS. Results show that temperature and pH exert significant effects on the ability of bio-char and magnetized bio-char to adsorb heavy metals. Additionally, the magnetic bio-char removed the heavy metals and remediated the solutions more effectively than the non-magnetic bio-char.

BSE-48**Name, Major:** Melanie Tran, Biological Engineering**Project Name:** *Bacterial Metabolite Concentrations using NMR Spectroscopy***Faculty Advisor, Department:** Nicholas Fitzkee, Chemistry**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: An organism's metabolome consists of the library of small molecules involved in that organism's metabolism at any given time. It reflects each cell's changing chemical needs as compounds are produced and consumed throughout its life cycle. Correspondingly, metabolomics is the study of these compounds and their changing concentrations, with the ultimate goal of relating this information to disease states. Because of its high sensitivity and spectral resolution, nuclear magnetic resonance spectroscopy (NMR) is an attractive technique for studying metabolomics. In this work, strains of several organisms, such as *Streptococcus pneumoniae* and *Listeria monocytogenes*, have been studied to determine the concentrations of metabolites in their growth media, in order to understand their cellular activity. Proton (¹H) NMR spectroscopy has been used to analyze controlled metabolites, controlled mixtures, and bacterial samples. A Spectra Base (a library of spectra of controlled metabolites) and a Knowledge Base (the Spectra Base with additions of chemical components of the metabolites) was built in order to be used in analysis of each of the samples. Using AMIX-Viewer software, the spectra are analyzed and compared using AMIX's Analytical Profiler tool, which has the ability to both identify and quantify the metabolic footprint of a sample. By analyzing the NMR spectra with this method, concentrations of metabolites and the activity within the bacteria can be observed and better understood. Through greater understanding of bacteria and their cell activity, information can be acquired for medical use such as in drug targeting to prevent these pathogenic organisms from causing disease.

AH-T04

Name, Major: Emily Turner, Architecture

Project Name: *The Application of Architectural Theory of Multifamily Housing Through a Feminist Lens*

Faculty Advisor, Department: Alexis Gregory, Architecture

Project Type: Talk

Project Category: Arts and Humanities

Abstract: Women have struggled to make their place in architecture throughout modern times as both practitioners and educators. Feminist architecture theory has also struggled to be accepted by male-dominated architectural theory. However, the feminist ideals espoused by both theorists and educators have become more common in the last ten years of architectural education and practice through the implementation of community design and design/build projects. The proliferation of female influence in the built environment began with wealthy female clients who wanted to help through the construction of social architecture. These women fostered a female ethic through the buildings they patronized. Additionally, female writers on architecture had a large influence on the built environment through their discussions on the social and cultural impacts of architecture. Due to this men began to overtake this cultural influence of architectural writing through the formation of journals such as *Architectural Record*. This reappropriation of female ideas and influence can be seen in other areas of architecture and architecture theory. This research idea posited that the ideas of architectural feminists have yet again been reappropriated by men in the exploration of community design and design/build projects, such as the Rural Studio at Auburn University, and consequently have created a more integrated and successful way to educate architects. Additionally, why are there so few women who are currently heading the studios that accomplish these successful projects? After extensive research, my approach to this paper idea changed due to the resources available on my chosen subject. The barrier I discovered was that there was little information on the reappropriation of feminist ideals in architecture related to community design. I shifted my focus to housing reform, broadening my scope to find more information, allowing me to see the full scope of women's involvement throughout history in the domestic sphere of architecture.

AH-T05

Name, Major: Lien Van Geel, English

Project Name: *"Could you expect me to rejoice in the inferiority of your connections?": The (Seeming) Importance of Social Status and Money in Pride and Prejudice*

Faculty Advisor, Department: Thomas Anderson, English

Project Type: Talk

Project Category: Arts and Humanities

Abstract: In *Pride and Prejudice*, social class is initially regarded as the omnipotent force which decides each and every person's outcome. All characters are described in terms of their money and social status, aspects which thus become their main trait. Initially, money and connections will determine their outcomes, and little social mobility is permitted, or, at least, so it seems. As the plot develops, it becomes clear that money and status are not at all the determiners of one's virtues, despite this prevalent perception in most of the characters' minds; characters with the highest income and standing such as Lady Catherine de Bourgh and Miss Bingley prove to be those with the least favourable character traits and, consequently, the least favourable ending. Mr. Darcy seems to venture in the same direction but alters his conduct significantly after Elizabeth's rejection. Elizabeth and Jane, although not in the possession of a large fortune or grand connections in the beginning, are able to climb the social ladder thanks to their (altered) virtues, resulting in marital bliss. Their endings prove that the novel's society does allow social mobility, since the novel subverts parts of the class system. The novel, indeed, in the fashion of Frederick Jameson, "proves to be an indispensable instrument for revealing those logical and ideological centres a particular historical text fails to realise, or on the contrary seeks desperately to repress," which is seen in "the related problem of the 'character' ... or more precisely, that of the social class" (34). I argue that, while social standing is displayed as the most important and determining factor in one's happiness, characters of lower status but better disposition receive the more advantageous outcome, suggesting money does not automatically lead to virtue.

BSE-49**Name, Major:** Thomas Chase Waldrin, Animal & Dairy Sciences**Project Name:** *Effects of Extended Retail Display on Quality Attributes of Ground Beef***Faculty Advisor, Department:** Thu Dinh, Animal & Dairy Sciences**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: Degradation of quality caused by oxidation and microbial spoilage during retail display results in almost 40% loss of all muscle foods. Ground beef (GB) typically has a short shelf life of 3 to 5 d. The objective of this study was to evaluate the effect of extended storage under simulated retail display conditions on pH, color, and oxidative status of this product. Two batches of GB (90% lean formulation) were separately produced and used in two trials. In each trial, thirty-six 454-g GB loaves were formed, placed on black Styrofoam™ trays, overwrapped with PVC film, and displayed at 2°C under fluorescent light (900 lux) for 0, 4, 8, 12, 24, 36, 48, 72, 96, 120, 144, 168, 192, 216, 240, 264, 288, and 312 h. At each time point, two randomly selected loaves per trial were withdrawn, and pH, objective color (L*, a*, and b*), antioxidant capacity, and thiobarbituric acid reactive substances were measured. Statistical analysis was performed using the GLIMMIX procedure of SAS (SAS Institute Inc., Cary, NC). Statistical significance was determined at $P \leq 0.05$. The pH value of GB continued to increase with display time ($P < 0.001$), from 5.61 (0 h) to 5.98 (240 h). Trolox equivalent antioxidant capacity (mmol of trolox/kg of meat) decreased by 23.5% ($P < 0.001$) steadily over a 312-h period, and TBARS value increased from 1.45 to 2.37 mg of malondialdehyde/kg of meat ($P = 0.050$). As expected, lightness and yellowness of GB continuously decreased by 19% ($P < 0.001$) and 48% ($P < 0.001$), respectively. Redness of GB decreased from 30.83 to 10.59 ($P < 0.001$) during the first 96 h, however, unexpectedly increased to 18.74 ($P < 0.001$), which might be associated with microbial production of reductases. These results provide insights into strategies to improve shelf life of meats.

SS-23**Name, Major:** Molly White, Educational Psychology**Project Name:** *The Effect of Fact-Paced Video Games on Color Vision, Working Memory, and Attention Span***Faculty Advisor, Department:** Elaine Wei; Counseling, Educational Psychology & Foundations**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Although video games are often accused of causing a slew of negative outcomes in today's society, research has indicated that there may be some positive influences that certain types of video games have on cognitive ability. We wanted to determine if playing fast-paced video games for thirty minutes per day for two weeks would improve participants color vision, working memory, and attention span, which are three areas often seen as useful abilities to succeed in a classroom setting. Both a control group (3 male, 2 female) and a treatment group (5 male) were implemented, where all participants were between the ages of 19-26. We hypothesized that the treatment group would improve in each of the three areas after treatment, and the control group would remain relatively stable in the three areas. Each participant engaged in a color vision task, 3 working memory tasks, and an attention span task before beginning to two-week treatment period. After this treatment period, in which the control group abstained from video games and the treatment group engaged in a particular video game for 30 minutes per day, each group was given the same tasks. We ran an independent samples t-test with split data for pre-test and post-test to compare the scores in each category between the control group and the treatment group. We found that the control group scored significantly higher on attention span scores post-treatment, indicating that playing fast-paced video games may have a negative impact on attention span. However, more research is needed to conclude the impact of video games on other cognitive abilities.

BSE-T17**Name, Major:** William Whitfield, Agronomy**Project Name:** *Light Weight Roller Technology Impacts on Ultradwarf Bermudagrass Putting Greens***Faculty Advisor, Department:** Christian Baldwin, Plant & Soil Sciences**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Recently, lightweight rolling has become a popular putting green management tool in Northern environments. Reported benefits include a firmer/smoothier putting surface, reduced disease incidence, improved topdressing incorporation, and decreased insect activity. However, no research exists examining the impacts of rolling on bermudagrass putting green species. Therefore, the research objective was to determine how to best incorporate lightweight roller technology into a bermudagrass greens management program to maximize playability and plant health. Research was conducted from 1 June 2015 to 31 August 2015 at the R.R. Foil Plant Science Research Center, Mississippi State University, Starkville, MS on a USGA sand-based ultradwarf bermudagrass putting green (cultivar: Champion). This study will be repeated in 2016. Treatments included mowing height (3.2 and 4.0 mm), mowing frequency (3 and 5 days per week), and rolling frequency (0, 1, 3, and 5 days per week). Data collection included ball roll, bulk density, normalized difference vegetative index (NDVI), and total shoot chlorophyll. At the end of the study, rolling five times per week increased chlorophyll concentration 15% and ball roll 12% compared to no rolling. Regarding NDVI and bulk density, no significant differences were noted indicating that rolling did not impact visual quality or soil physical properties. In summary, to maximize plant health and playability, results suggest incorporating rolling into a bermudagrass greens management program at least 3 times per week.

SS-24**Name, Major:** Staci Wigelsworth, Psychology**Project Name:** *Women in Leadership Roles***Faculty Advisor, Department:** Kristina Hood, Clinical Psychology**Project Type:** Poster**Project Category:** Social Sciences

Abstract: Women in Leadership Roles Staci Wigelsworth, Samantha Booker, Destini Smith, Katrina Speed, and Kristina Hood Despite increasing gender parity in society, gendered attitudes regarding authority influence prejudice against women in positions of power (Rudman & Kilianski, 2000). Moreover, Role Congruity Theory posits that attitudes toward women are less positive when women are in leadership roles (Eagly & Karau, 2002). Although such discrimination is based on gender, this discrimination is not blindly enacted. Kolb (1997) found that leadership attitudes predict beliefs about leaders having more masculine traits, while Bouldry, Wood, and Kashy (2001) found that men were more likely to be perceived as possessing leadership qualities necessary to be effective in military performance. Thus, men are more likely than women to be perceived as being capable of action-oriented, “take-charge” leadership (Prime, 2009). However, a lack of research has analyzed the relationship between attitudes towards women, leadership beliefs, and gender preference for authority roles. Thus, the purpose of this study is to look at these relationships and better define their interaction. We hypothesized that leadership beliefs would mediate the relationship between attitudes toward women and preference for men in military leadership positions. For this study, college undergraduates (N=492) from a Southeastern university completed an online survey for extra credit. The survey included the Attitudes toward Women Scale, the Leadership Attributes Beliefs Scale, and an adapted version of the Gender and Authority Measure. A mediation regression was conducted using the SPSS macro Process (Hayes, 2014). Results yielded a statistically significant partial mediation, such that as hierarchical leadership beliefs and egalitarian attitudes increase, preference for men in military leadership positions decreases. Results imply that individuals’ attitudes regarding leadership qualities and women influence preferences for a male or female military leader. Findings can help explain, and eventually dismantle, institutional sexism among military members and promote equal opportunity for women in the armed forces.

BSE-50

Name, Major: Douglas Williams, Biochemistry

Project Name: *Interactions Between Glycoprotein E and bIcp0 in Late Stage Infection of Bovine Herpesvirus-1*

Faculty Advisor, Department: Florencia Meyer, Biochemistry & Molecular Biology

Project Type: Poster

Project Category: Biological Sciences and Engineering

Abstract: Glycoprotein E is a viral glycoprotein that functions to promote viral entry into a host cell. This glycoprotein plays a key role in the spreading of Herpes Simplex Virus (HSV), and also with virus-induced cell fusion. It has been hypothesized that during the late stages of viral infection by HSV, glycoprotein E is most likely interacting with another viral protein called infected-cell protein 0, or bICP0. In order to confirm the upregulation of glycoprotein E, a western blot was carried out using infected cells collected at 8, 12, 16, and 24 hours post infection, respectively. The result showed a distinct increase in expression of glycoprotein E as infection time moved forward, which implies that glycoprotein E may have a role in the late stages of infection or cell death. An immunoprecipitation and subsequent western blot was then carried out using cell lysates to investigate the interactions between these two proteins.

AH-T06

Name, Major: Ryan Williams, General Liberal Arts

Project Name: *Cicero and Epicureanism*

Faculty Advisor, Department: Mark Clark, Classical & Modern Languages and Literature

Project Type: Talk

Project Category: Arts and Humanities

Abstract: In this paper, I will discuss Cicero's *Somnium Scipionis* and *De re publica* as Cicero's response to Epicureanism, particularly from Lucretius' *De rerum natura*. I will show how *Somnium Scipionis* is a continuation of *De re publica* as the *De re publica* is not only a look at Cicero's political theories, but also, as a whole, his response to the entirety of Epicureanism as set down by Epicurus and Lucretius. In the *De re publica*, Cicero presents Epicureanism in clear terms as a foil to Scipio and other notable Romans. This is the main discussion of the first five books of *De re publica*; however, the purpose of *De re publica* book 6, commonly known as the *Somnium Scipionis*, and the connection with the rest of the work is less easily discerned. In her two volume work, Dr. Hannah Arendt (1978) sees no connection between the rest of *De re publica* and *Somnium Scipionis*. In his work, Dr. Jed Atkins (2013) suggests that the two pieces of *De re publica* are connected through the political theory that Cicero is discussing in a much more subtle way and that the *Somnium Scipionis* is a cosmological metaphor for Cicero's Republic. I propose that the *Somnium Scipionis* is connected to the rest of *De re publica* as Cicero's response to Epicurean physics while the rest of *De re publica* is a response to Epicurean political theory.

BSE-T18**Name, Major:** Erin Wilson, Biochemistry**Project Name:** *Resistance to Acetolactate-synthase (ALS) Inhibitor in Annual Bluegrass (Poa annua): Mechanisms and Plate Assay for Rapid Detection***Faculty Advisor, Department:** Re-Min Paul Tseng, Plant & Soil Sciences**Project Type:** Talk**Project Category:** Biological Sciences and Engineering

Abstract: Annual bluegrass (*Poa annua*) is considered one of the most troublesome weeds in managed turfgrass in Mississippi. Acetolactate synthase (ALS)-inhibiting herbicides are most commonly used for control of annual bluegrass. However, repeated usage of these herbicides has resulted in resistance to them, as reported in Alabama and Tennessee. In Mississippi, our group was the first to confirm and report an annual bluegrass population (Reunion) resistant to foramsulfuron (ALS-inhibiting herbicide). The objectives of this study is to develop a set of allele-specific molecular markers for herbicide resistant trait, which can then be used for confirming resistance of any annual bluegrass sample from residential or commercial turfgrass, in less than a day; and, conduct RNA-Seq transcriptome analysis to find candidate genes that confer metabolic resistance to foramsulfuron in Reunion. Dose response studies revealed Reunion to be 45 times more resistant to foramsulfuron than the susceptible annual bluegrass population. Reunion requires 331g of foramsulfuron/ha, whereas the susceptible population only requires 7.2 g/ha, to achieve 50% control. Mutation of ALS gene resulting in an amino acid substitution, Trp574 to Leu, is reported as one of the possible mechanisms of resistance to ALS-inhibitors in annual bluegrass. Using this information, simple sequence repeat markers can be designed specific to Trp574Leu mutation, and used for rapid screening of annual bluegrass samples suspected to be resistant. The transcriptomes for resistant and sensitive annual bluegrass populations will serve as a resource for further understanding the biochemical pathways leading to resistance evolution in annual bluegrass.

BSE-51**Name, Major:** Sarah Wippel, Human Sciences (Human Dev & Family Studies)**Project Name:** *Assessing Tactile Defensiveness in Children with Disabilities***Faculty Advisor, Department:** Joe Wilmoth, Human Development and Family Studies**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: In the United States, about one in six children have one or more developmental disabilities, making it vital that their environments provide a solid foundation for future success. Many children, however, are excluded from classrooms due to negative behavior, making identifying the source of bad behavior also critical. Tactile defensiveness, a little-recognized source of negative behavior, has been shown to often accompany developmental disorders: when fabrics these children are accustomed to are changed, these children are prone to emotional breakdowns. Constantly displaying this negative behavior could slow a child's overall development. Thus, this proposal will focus on how different fabrics and their textures impact children with special needs, and if changing their everyday fabric to fabric that negates their Tactile Defensiveness has any effect on their overall development. This research will investigate how different textures of fabrics affect children with Tactile Defensiveness and how textiles could be used to calm children with TD in stressful situations. The study will include 10 children each in investigational and control groups from age 3 to 13. Development of the children in both groups will be assessed at the start of the study using the Developmental Milestones stages as well as Erikson's stages of Social and Emotional Development. Only investigational subjects, however, will be presented with a variety of fabrics at the beginning of the study and their level of Tactile Defensiveness (TD) with each fabric recorded using a list of TD behaviors found on the Sensory Processing Disorder website. Once recorded, the child's parents will be instructed to avoid the fabrics that caused the highest level of TD behaviors. Children in both group's development will then be assessed at ages 8 and 13. At the end of the study, a comparison will be conducted of both group's development to observe any differences.

SS-25

Name, Major: Katherine Wood, Physical Education/Kinesiology

Project Name: *Adolescent Stress, Coping Resources, and Health in High Risk Students Participating in a Studio Based Learning Summer Camp*

Faculty Advisor, Department: Megan Holmes, Kinesiology

Project Type: Poster

Project Category: Social Sciences

Abstract: Stress and coping in adolescence is a major concern as recent literature suggest that if uncontrolled stress can lead to chronic health conditions in adulthood. **PURPOSE:** This study examined what factors contribute to stress in adolescence and how coping can help overall health. **METHODS:** At risk 6th-9th grade students (n=18) were invited to participate in an educational summer camp project aimed at developing knowledge of core curriculum by working on specific design projects. Participates were asked to complete two surveys one on stressors and how they affected them. The other was on coping mechanisms and to what extent they sued each of them. **RESULTS:** Mean height approximated 162.1 cm which is in the 50th percentile, mean weight was 62 kg. Of the 16 participates 9 were in the BMI category of normal weight and 7 were in the BMI category of overweight or obese. In looking at the Total stress of the normal weigh category they had a mean score of 119.8. Compared to the overweight category of a total stress score of 124.7. In the coping questionnaire we focused on coping mechanisms that allowed participates to engage in demanding activates. The normal weight category had a mean score of 12.6. The overweight category had a mean score of 11.1.

SS-26

Name, Major: Anna Wooten, Human Sciences (Apparel Textiles & Merchandising)

Project Name: *Effects of U.S Subsidies and Their Impact on the Competitiveness of the Mississippi Cotton Industry*

Faculty Advisor, Department: JuYoung Lee, Fashion Design & Merchandising

Project Type: Poster

Project Category: Social Sciences

Abstract: There is rising global controversy over governmental policies in the United States involving the agriculture industry; other countries have complained about the level of support the American government is giving the industry (Helling, Beaulier, & Hall, 2008). The cotton industry is a specific sector of the industry that has been criticized; for example, in the early 2000's, Brazil and Canada filed formal complaints to the World Trade Organization (WTO) against the United States in regards to the domestic subsidy aids given to American cotton and corn farmers (Lakatos & Walmsley, 2014; Schnepf, 2007). African countries claimed U.S. cotton subsidies created a cost disadvantage that impedes them from participating in the international market (Helling, Beaulier, & Hall, 2008, 65-66). According to the Environmental Working Group (EWG) Farm Subsidies using USDA data, the total amount of U.S. agriculture subsidies just over the past 17 years has equaled almost 300 billion dollars (2012b). This amount may seem excessive to these outside critics with their skewed perception of believing American farmers receive unprecedented levels government aid. These provisions keep the industry competitive and afloat. However, in recent years there has been an overall decrease in subsidy amounts (Environmental Working Group [EWG], 2012b). Therefore, the purpose of this research is to analyze the effects of subsidies and their impact on the competitiveness of the Mississippi Cotton Industry. This poster reports the progress of this research through systematic literature review. As a result of this study, information on U.S. subsidies can be conveyed to farmers or other researchers, and bring attention Mississippi cotton industry competitiveness. Porter's Theory is used to explain the forces of competition in the industry, and individual farmers' point of view will be used to develop a more descriptive picture of how the industry is being affected (Porter, 1979, 137-45). References Environmental Working Group, Farm Subsidies. (2012). The United States summary information [Data]. Retrieved from: <http://farm.ewg.org/region.php?fips=00000&statername=theUnitedStates> Helling, M., Beaulier, S., & Hall, J. (2008). High cotton: Why the USA should not providesubsides to cotton farmers. *Economic Affairs*, 28 (2), 65-66. Lakatos, C., & Walmsley, T. (2014). Dispute settlement at the WTO: Impacts of a no deal in the US-Brazil cotton dispute. *World Economy*. 37(2), 244-66. doi: 10.1111/twec.12110 Porter, M. E. (1979). How competitive forces shape strategy. *Harvard Business Review*. 57(2), 137-45). Schnepf, R. (2007). U.S.-Canada WTO corn trade dispute. Congressional Research Service.

BSE-52**Name, Major:** Christian Young, Biological Engineering**Project Name:** *The Characterization of Crosslinking Stability for Storage and in vivo Purposes***Faculty Advisor, Department:** Steve Elder, Agriculture and Biological Engineering**Project Type:** Poster**Project Category:** Biological Sciences and Engineering

Abstract: The Characterization of Crosslinking Stability for Storage and in vivo Purposes The current research is part of an ongoing project to develop a porcine osteochondral xenograft for the repair of injured human knee cartilage. The xenografts are crosslinked to improve their biomechanical properties, increase resistance to enzymatic degradation, and reduce immunogenicity. Crosslinkers of interest include genipin, epigallocatechin gallate (EGCG), and grape seed extract (GSE), with glutaraldehyde serving as a positive control. The purpose of this study was to determine the stability of crosslinking under simulated in vivo (after implantation) conditions. The in vivo environment was simulated by incubating porcine osteochondral crosslinked plugs in phosphate-buffered saline (PBS) and antibiotics at 37°C, changing the solution once per week. After 30 days the grafts were freeze-dried and weighed. The degree of crosslinking was determined based on reaction of the tissue with ninhydrin solution, normalizing to tissue weight. The crosslinkers bind to free amino groups in the tissue, and ninhydrin also reacts with free amino groups producing a purple color that can be read at 570 nm in a spectrophotometer. Thus, the degree of crosslinking can be calculated by comparing ninhydrin's reaction with crosslinked tissue to its reaction with fresh, non-crosslinked tissue. The effect of the 30-day incubation period was determined by comparing the degree of crosslinking to that of freshly crosslinked plugs. The starting of crosslinking in the tissue fixed with genipin (97%) and glutaraldehyde (99%) was statistically greater than in EGCG (89%) and GSE (83%). However, all crosslinked plugs experienced a statistically similar 15-20% reduction in the degree of crosslinking during the 30-day incubation period. Overall, this research was designed to simulate the stability of crosslinking in vivo without the use of animals. The results will guide selection of the appropriate crosslinker to achieve the desired rate of degradation in vivo.

PSE-33**Name, Major:** Tom Zhang, Mechanical Engineering**Project Name:** *Effect of Heat Treatment on Direct Laser Deposited Nitinol***Faculty Advisor, Department:** Mina Shamsaei, Mechanical Engineering**Project Type:** Poster**Project Category:** Physical Sciences and Engineering

Abstract: Nitinol, a metal alloy of nickel and titanium, has many unique properties such as biocompatibility, superelasticity, and shape memory effects. It is widely applied to the production of medical and dental devices and implants as well as aerospace and automotive components and structures. Direct Laser Deposition, an additive manufacturing technique, has been used to fabricate Nitinol. Post-fabrication heat treatments are often applied to improve mechanical properties of the material. The aim of this project is to experimentally determine the effects of heat treatment on mechanical response, microstructure, and phase transformation of Direct Laser Deposited Nitinol. Specimens were heat treated at 550 °C under different combinations of heating environments (salt bath and air) and cooling environments (ice water quench and air) with different durations. Specimens were also put under cyclic loading for 500 cycles, and the stress-strain relationships were recorded for the first and the last cycle to study the mechanical response of the material. Optical microscope was used to investigate the microstructure of the material after the specimen is cut, polished, and etched. Microstructure was studied both before and after the cyclic loading on two specimens under the same heat treatment procedure. The results showed that heat treatments can cause a decrease in the material's plateau stress.

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