13th Annual MSU Graduate Student Research Symposium

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Symposium Guide

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Oral Presentations

Arts and Humanities

Tianyu Li and Qingmin Meng
Geospatial Science, Ph.D.
Geospatial Analysis of Rock Band Popularity

Abstract:
Geographic impacts can be observed in many sociological, cultural and economic areas. If the relationship exists in pop music, that might not surprise us at all, since geospatial science could enable us to expect an occurrence of clustering of important musicians and musical works in specific genres or styles spatiotemporally. Specifically, hot spot maps are always used to visualize geographic data in order to show areas where a higher density or cluster of activity occurs. In this study we will test this idea quantitatively using data on recent years top ranked rock bands and their tour information. The GIS (geographic information science) software helped us to locate sites in tour list of each of those bands. And then the data was employed to examine popularity of a band geographically. The designation of an area with high occurrence or low occurrence to be a destination of band tour was defined by hot spot analysis in terms of its statistical confidence. By examining how music is tied to geography, this paper not only emphasized aspects of the geography itself when explaining why a rock bands are more popular in a particular area than in others, it is also a prerequisite work for future researches which focusing on how social, cultural and economic factors contribute to the popularity of a rock band.

Christina Ramazani, Molly Zuckerman, Nicholas Herrmann, Evan Garofalo, David R Hunt, Tsend Amgalantugs, and Bruno Frohlich
Applied Anthropology, M.A.
No Use Crying over a Broken Yasa: A Case Study of Execution and Postmortem Treatment of Women and Children in Late Medieval Southern Mongolia

Abstract:
This study presents results from the contextualized analysis of an assemblage (n=9) of naturally mummified individuals--one adult female, two adult males, two adolescents, one juvenile, and three infants--recovered from the Hets Mountain Cave site in southern Mongolia, where they had been secondarily deposited. The assemblage dates to AD 1434-1651, which overlaps the Ming and Quing Dynasties and the end of the Great Mongolian Empire, periods characterized by political instability, widespread conflict, regime change, poverty, and famine. The individuals do not manifest skeletal stress indicators, but do exhibit substantial perimortem trauma, including evidence of garroting, and sharp and blunt force trauma to the cranial and cervical regions, which in the female is compatible with having the head pulled forcibly backwards over a bar in the posterior cervical region. Here, we present an analysis of the trauma, focusing on the subadults and adult female, utilizing macroscopic evaluation. Results are contextualized within documentary and archaeological data on contemporary Mongolian mortuary and cultural practices to better understand who these individuals were and why they were executed in this symbolic manner. While the trauma patterns are consistent with execution methods appropriate for higher status Mongolians, the trauma to the subadults suggests a violation of traditional prohibitions against killing children. These findings speak to the utility of case-study based analyses in complementing more top-down historical studies for understanding the effects of political and economic turmoil, conflict, and violence upon women and children during poorly documented time periods.
**Abstract:**
β2-adrenoceptor (β2-AR) agonist administration is foundational for asthma therapy. However, chronic administration of β2-AR agonists increases asthma severity and β2-AR signaling is required to induce the asthma phenotype in a murine model. Thus, there is a critical need to identify novel facets of asthma’s pathophysiology, particularly as it pertains to mechanisms that control airway hyper-responsiveness (AHR) and bronchoconstriction, in order to identify novel targets for asthma therapy. Equine summer pasture associated recurrent airway obstruction (SPARAO, aka “pasture heaves”) is a spontaneous asthma-like disease affecting horses in the southeastern United States that possesses key facets of the severe asthmatic phenotype, including AHR and neutrophilic airway inflammation. To identify novel pathophysiologic mechanisms of asthma, we screened for molecular signatures of asthmatic AHR and neutrophil inflammation. RNA sequencing was performed on serially sampled lung biopsies acquired from SPARAO-affected and non-diseased horses during seasonal disease exacerbation and remission. 180 gene products were identified as differentially expressed by season and disease at a 5% false discovery rate. Ingenuity Pathway Analysis identified 13 of these DEGs in the top molecular network: respiratory disease, inflammatory disease, and cancer. 10 of these 13 DEGs were relevant to asthma, mediating airway hyper-responsiveness, airway inflammation, and airway remodeling. DEGs expressed during disease collectively increased neutrophil recruitment, migration, mobility, binding, and accumulation. Accordingly network analysis can be employed to identify molecular signatures of disease and to characterize complex molecular events in genome scale datasets derived from clinically relevant equine disease.
John T. Buol, Amber Eytcheson, and Dr. Daniel B. Reynolds
Agronomy-Weed Science, M.S.

The Effect of Cotton Growth Stage on Susceptibility to Plant Growth Regulating Herbicide Injury

Abstract:
As the global population rises and the demand for food and fiber increase, the proliferation of herbicide-resistant weeds poses a serious threat to crop producers worldwide. Emerging herbicide-tolerant crop technologies may provide benefits such as alternative control options, more robust resistance management, and crop yield increases. However, these technologies are associated with concerns regarding herbicide drift, volatilization, and spray tank contamination. Research has been conducted with low concentration applications of several herbicides to various crop species to assess their effect on growth and yield. Previous findings suggest that differences may exist in the level of injury relative to crop growth stage at time of exposure.

An experiment was conducted to assess the effect of application timing of the plant growth regulating herbicides dicamba (3,6-dichloro-2-methoxybenzoic acid) and 2,4-D (2,4-dichlorophenoxyacetic acid) on cotton (Gossypium hirsutum) growth and yield. A single application of each herbicide was applied to separate plots from one to fourteen weeks after emergence (WAE). Crop height, growth stage, and visual injury ratings relative to an untreated plot were recorded 28 days after treatment (DAT), and yield information was recorded at harvest.

Contrary to late-season applications, early and mid-season applications of both herbicides decreased cotton yield. The greatest yield reductions from dicamba injury occurred from applications made 5 to 9 WAE, whereas the greatest reductions from 2,4-D injury occurred from applications made 4 to 7 WAE. Our data suggest that cotton growth stage is a significant factor in yield reduction from low concentration applications of 2,4-D and dicamba.

Sara Fast, Veera Gnaneswar Gude, and Dennis D. Truax
Civil Engineering, M.S.

A comprehensive analysis of the removal of emerging contaminants from water and wastewater using advanced oxidation processes

Abstract:
The presence of pollutants known as emerging contaminants in drinking water and water bodies, such as rivers and streams, is a topic of growing interest. Emerging contaminants, which include endocrine disrupting compounds (EDCs) and pharmaceutical and personal care products (PPCPs), are compounds that remain relatively unknown, although their adverse effects on both humans and wildlife have been proven. Furthermore, there are no standards in place to regulate the amounts of these chemicals that are legally allowed to be discharged into a waterbody. Emerging contaminants are not satisfactorily removed by traditional water and wastewater treatment methods; therefore, there is a need for innovative techniques and processes. Advanced oxidation processes (AOPs) have been recognized as successful removal methods for these problematic pollutants. However, technical success is not the only factor that must be considered. Energy consumption, ease of use, public acceptance, human health effects, and contribution to climate change must also be taken into account. A comprehensive analysis was completed to determine the performance of several AOPs (ozonation, UV, photocatalysis, and integrated processes) across a variety of parameters. The AOPs were also compared to more commonly used traditional methods. This includes an analysis of energy consumption by each process, as well as estimated capital and operation and maintenance costs. The process that portrays effective performance in all areas of interest can be considered the most rational and realistic option.
**Justyn R. Foth**, Francisco J. Vilella, and Richard M. Kaminski  
Wildlife, Ph.D.

**Shorebird use of wetlands and aquaculture ponds in the Mississippi Alluvial Valley and Gulf Coast region**

*Abstract:*
Historically the Mississippi Alluvial Valley (MAV) was covered by forested wetlands. In the last century, most of the MAV has been converted for agricultural, aquaculture, and other land uses which have provided new stop-over habitats for migrating shorebirds. Prior to anthropogenic modification, shorebirds likely migrated past the MAV to wetlands along the Gulf Coast. In 2010, the Deep-water horizon oil spill impacted coastal marshes of the northern Gulf of Mexico. In response, the Natural Resources Conservation Service implemented the Migratory Bird Habitat Initiative (MBHI) to provide migratory shorebirds with interior wetland habitat to help offset damage to coastal wetlands. Our objective was to estimate species composition and relative abundance of migrating shorebirds on MBHI associated wetlands in the MAV and Gulf Coast regions during fall migration. During recent autumn surveys, mean relative abundance of shorebirds using MBHI enrolled wetlands was more than 8 times greater in 2011, more than 4 times greater in 2012, and more than 7 times greater in 2013 than wetlands not enrolled in MBHI. On average during peak migration in early September across years, MBHI sites had > 7 times more birds per acre than state or federal managed or conserved coastal wetlands in Alabama, Louisiana, and Mississippi combined. Thus, MBHI-managed former catfish production ponds provided important habitat for migrating shorebirds and other waterbirds during summer through fall, especially in drought years when other wetlands may have been limited. Our research will eventually provide conservation planners with tools to predict shorebird abundance and manage wetlands accordingly.

**Katherine M. Graham, Cecilia J. Langhorne, Andrew J. Kouba, Carrie K. Vance, and Scott T. Willard**  
Animal Physiology, M.S.

**Conserving amphibians through assisted reproductive technologies: use of exogenous hormone treatments to induce ovulation in the critically endangered Mississippi gopher frog (*Lithobates sevosa*)**

*Abstract:*
Worldwide, there is an amphibian survival crisis with over 33% of all species threatened with extinction. One iconic species that represents this crisis, is the Mississippi gopher frog (*Lithobates sevosa*), a critically endangered amphibian with an estimated 100 adults remaining in the wild. As this species has failed to reproduce naturally in captive breeding programs, our research focuses on the development of assisted reproductive technologies (ART) to aid in their conservation. Strategies for ART include the use of exogenous hormones for gamete collection, artificial fertilization, and cryopreservation of gametes. One challenge in developing ART for Mississippi gopher frogs has been difficulty obtaining eggs from females. Thus, we developed a study examining four exogenous hormone treatments to induce ovulation in female gopher frogs. Hormone treatments (n=5 animals/treatment) include: A) gonadotropin-releasing hormone agonist (GnRHa); B) GnRHa and the dopamine antagonist metoclopramide hydrochloride; C) GnRHa and human chorionic gonadotropin (hCG); and D) GnRHa and hCG following two low priming doses of hCG. In addition, ultrasound data were collected daily after hormone injection. Preliminary results indicate there is no significant difference (P>0.05) between treatments in responsiveness (ovulations) or number of eggs produced. As determined by ultrasound, all ovulating frogs demonstrated an increase in follicular development following hormone treatment. Additional trials will help determine the most reliable hormone treatment for inducing ovulation in the Mississippi gopher frog. By stimulating females to lay eggs, we have a greater opportunity to conduct *in vitro* fertilization trials and produce more offspring for captive assurance colonies and reintroduction programs.
Matthew Hock, W. Brien Henry, Chathurika Wijewardana, and K. Raja Reddy
Agronomy, M.S.
Hybrid and Planting Date Effects on Corn Growth and Yield Under a Dryland Production System in Central Mississippi.

Abstract:
Corn, (Zea mays L.) like all crops needs moisture for growth and development. However, corn is more responsive to irrigation than other crops, especially during reproductive growth stages. The critical period for corn production during which moisture must be present to ensure optimum yields is a two to three week window around tasseling. Corn in Mississippi is planted the middle of March through the later part of April. Planting corn during these times results in the reproductive phase falling during the months of June and July, which are usually the hottest, driest months of the year.
Experiments evaluating early planting dates were conducted from 2013 to 2014 at two locations in central Mississippi. The objective of the experiment was to determine the growth and yield effects that planting date had on four commercially available hybrids.
Each year and location experienced yield differences across planting dates. However, there was a 7% to 27% yield benefit attributable to planting early in 2013 with a 5% to 88% benefit for planting early in 2014.
Data suggests there are benefits to planting corn early in Mississippi and hybrid selection does affect yield. The ultimate decision to plant early depends upon a producer’s soil type, equipment and especially upon personal risk/reward tolerance. However, in selecting a planting date, there appears to be far greater yield penalties associated with late planting as compared to early planting.

Juriel A. Rogers and Elizabeth P. Tofte
Landscape Architecture, M.S.
Inciting Change to Reduce Stress in Public Housing using Healing Gardens.

Abstract:
The purpose of this study was to provide insight on the relationship between women of lower socioeconomic public housing communities, their external living environment (outdoors), and their perceived level of stress. Literature supports that women who live in lower socioeconomic public housing communities experience high rates of malnutrition, fatigue, susceptibility to infection, and premature death (Cohen, 1994; Whelch & Kneipp, 2005). The research looked at two groups of women residing in lower socioeconomic public housing communities where they were asked whether their stress level was affected by viewing an audiovisual simulation of two different recovery conditions: a healing garden or an existing public housing ground. Protocol was based on Ulrich et al. 1991. Due to the lack of accessibility to the public housing grounds, a simulation was used in place of an onsite model. Implication was made through the creation of a healing garden simulation in the Lumion 3D Education Software. Research methods analyzed the participants’ response to the presence of healing gardens in a public housing setting where the head of household was an African-American female (http://portal.hud.gov). Studying the environmental preference of women residing in lower socioeconomic public housing communities and their perceived level of stress will provide quantitative data that formalizes the effect of the presence of a healing garden in lower socioeconomic public housing communities. The importance of this research provides a step towards better understanding how the two different types of landscapes affect women’s stress levels.
Anberitha T. Matthews, Abdolsamad Borazjani, and Matthew Ross  
Veterinary Medical Sciences Research, Ph.D.  
**Increased oxidative stress enhances endocannabinoid tone**

**Abstract:**  
Cardiovascular disease (CVD) has been characterized as a chronic inflammatory disease that has become prevalent in industrialized societies. NADPH oxidase contributes to atherosclerosis through the activation of macrophages leading to the internalization of oxidized low-density lipoproteins (oxLDL). Chronic inflammation is caused in part by monocytes invading the vasculature leading to the formation of lipid-laden macrophage foam cells with increased flux of oxygen/nitrogen radicals and subsequent chemical modification of extracellular LDL. Endogenous cannabinoids (eCB), such as 2-arachidonoylglycerol (2-AG), may be a link between oxidative stress and atherosclerosis. We hypothesize that 2-AG biosynthesis is enhanced following CD36 ligation by oxLDL and subsequent activation of diacylglycerol lipase β (DAGLβ), the key biosynthetic enzyme of 2-AG, via upregulated NADPH oxidase activity. Treatment of murine J774 macrophages and human THP1 macrophages/monocytes with either extracellular xanthine/xanthine oxidase or phorbol 12-myristate 13-acetate (PMA) caused an increase in superoxide (O2•−) levels and enhanced 2-AG biosynthesis (2.3-fold and 2.8-fold, respectively) compared to vehicle controls. These treatments were not cytotoxic. These data suggest a significant positive correlation between oxygen radical flux and 2-AG biosynthesis in macrophages. Increased 2-AG biosynthesis may be an adaptive response to elevated oxidative stress because of antioxidant and anti-inflammatory actions associated with this bioactive lipid. Therefore, the pathogenesis of atherosclerosis within the vessel wall intima may be reduced by enhancing eCB tone. [Supported in part by NIH R15ES015348-02]

Preeti Muire, Larry Hanson, and Lora Petrie-Hanson  
Veterinary Medical Sciences Research, Ph.D.  
**Innate Lymphoid Cells (ILCs) in Zebrafish**

**Abstract:**  
Natural killer (NK) cells are innate immune cells that originate from a lymphoid progenitor. They can mediate an adaptive immune response in T and B lymphocyte deficient rag 2−/− mutant mice as well as T and B lymphocyte deficient rag1−/− mutant zebrafish. A new category of immune cells called innate lymphocyte cells (ILCs) was recently introduced. It comprises 3 subsets ILC1, ILC2 and ILC3 based on the transcription factors that trigger the production of immune cells from a common lymphoid progenitor. Unlike T and B-lymphocytes, ILCs lack antigen specific receptors and possess germline-encoded receptors. Recently, mammalian and murine NK cells have been classified under the ILC1 subset. ILC1 cells secrete type-1 cytokines such as IFN-γ and TNF-α in response to intracellular pathogens. ILCs in zebrafish have not yet been characterized. In our study, we utilized rag1−/− mutant zebrafish as an in vivo fish model to determine if TLR agonists (TLR2: βglucan, TLR3: POLY I:C and TLR 7/8: R-848) stimulate ILC1 cells in liver, kidney marrow or spleen tissues. We used IFNγ expression as an indicator of ILC1 cell activation, TNFα expression for ILC1 and macrophage activation, and MxA expression for IFNα and IFNβ production. With RT-qPCR we quantified transcript levels at 1h, 6h, 12h and 24h after injecting rag1−/− mutant zebrafish with R-848, POLY I:C or β-glucan. Our results show significant increases of IFNγ, MxA and TNFα transcripts in the three tissues with R848, Poly I:C and β glucan compared to PBS injected control fish. The data presented are the initial findings in an investigation to help define ILC1 cells and the mechanisms involved in ILC1 cell mediated protective immunity in rag1−/− mutant zebrafish.
Soma Mukherjee and Dr. Zee Haque
Food Science and Technology, Ph.D.

Use of ultra-high pressure to enhance antioxidative efficacy of Cheddar whey for use in edible coatings.

Abstract:
Ultra-High Pressure Homogenization (UHPH) enhances antioxidative property of Cheddar-whey solids (CW) due to dramatically increased surface area that allows greater protective interactions. This investigation looks at antioxidative efficacy of edible films containing CW (2%, w/v), with and without chitosan (Ch) (1%, w/v), exposed to various levels of UHPH; nil (control), 70, 140 and 210 MPa, in antioxidative protection of retail-cut Mississippi farm-raised catfish fillet. Coated samples exhibited significantly less (P<0.05) carbonyl contents (CC) following; 0, 1, 3, 5 and 7 days of storage at 4°C, compared to control. Addition of Ch markedly enhanced antioxidative efficacy particularly when subjected to UHPH at 140 MPa where CC was held down at 0.158 µmol/g after three days compared to 0.633 and 0.221 µmol/g, respectively for the control and CW only, pressure being the equal. The study can lead to the development of natural preservatives to augment shelf-life of muscle food products.

Michael Murphy, M. F. Horstemeyer, Steven R. Gwaltney, Tonya W. Stone, Michelle C. LaPlaca, Jun Liao, Lakiesha N. Williams, and R. Prabhu
Biomedical Engineering, Ph.D.

Effects of Stress State Dependence on Neuronal Phospholipid Bilayer Mechanical Response and Failure

Abstract:
Approximately 1.7 million new cases of traumatic brain injury (TBI) occur every year in the United States, resulting in both human and economic losses. Finite element models use multiscale constitutive material models to obtain more accurate stress responses during simulations of TBI scenarios, but require data from lower length scales. One key component for the multiscale material model involves studying neuronal membrane failure through its primary component, the phospholipid bilayer, because TBI is often a result of mechanoporation in the neuronal membrane. Prior studies have primarily focused on the equibiaxial stress state because the phospholipid bilayer is often under equibiaxial loading. However, other stress states must be considered for injury mechanics. In this study, the authors used molecular dynamics to examine stress state dependence for a simplified phospholipid bilayer using the von Mises (equivalent) stress and strain. A system with 72 1-palmitoyl-2-oleoylphosphatidylcholine (POPC) phospholipids and 9,070 TIP3P water molecules was equilibrated for 10 nanoseconds using the program LAMMPS and the CHARMM36 all-atom lipid force field. Constant velocity deformations were applied in the x and y dimensions to examine the equibiaxial, non-equibiaxial, strip biaxial, and uniaxial stress states. Deformations quickly resulted in a peak in stress which decreased before plateauing. As deformations continued, water penetration (failure) occurred and resulted in pores expanding more quickly. Compared to the uniaxial and strip biaxial stress states, higher stresses and lower failure strains were observed in the equibiaxial and non-equibiaxial stress states, indicating they should be considered more detrimental in multiscale material models of TBI.
Oluwaseun Felix Ogunola, Marilyn Warburton, Paul Williams, and Leigh Hawkins
Biochemistry, M.S.
Characterization of LOX gene family and the effect on aflatoxin accumulation resistance in maize

Abstract:
Maize (Zea mays L.) is a staple food of global importance, and also one of the most important cereal grains in the world. In hot, humid environments, it is prone to contamination by Aspergillus flavus, which produces a carcinogenic secondary metabolite known as aflatoxin. Development of resistant germplasm by the identification and selection of genes that contribute to resistance is one efficient way to reduce aflatoxin accumulation. Lipoxygenase (LOX) enzyme activity contributes to increased fungal resistance and decreased aflatoxin accumulation. In this study, all 13 genes in the ZmLOX family were characterized via genetic mapping. Markers within or linked to each gene sequence were developed, and used to map the phenotypic effect of each gene for resistance to aflatoxin accumulation in up to four QTL mapping populations and one association mapping panel. The lipoxygenase gene in bin 3.06 (which is either Lox 1 or 2, a pair of very closely linked genes) borders a known and highly significant QTL that has been previously reported. Lox10, in bin 4.09, and Lox11 in bin 5.04, both fell directly under two other previously published QTL and are both slightly associated with changes in aflatoxin accumulation. In addition, SNPs from within Lox7, in Bin 10.04 and Lox5 in bin 5.02 were associated with reduced aflatoxin. Independent tests to validate the effect of these genes in different genetic backgrounds are under way and the markers used to map the genes will be useful in Marker Assisted Selection to improve aflatoxin accumulation in the future.

Yemi Olojede, E. D. Peebles, P. D. Gerard, and S. Womack
Poultry Science, M.S.
Comparative evaluation of three different methods for determining embryo temperature in broiler hatching eggs during incubation

Abstract:
Among several factors needed for optimum avian embryonic development during incubation, temperature is the most important. In this study, relationships of eggshell (EST), air cell (ACT), and embryo cloacal (CT) temperatures in Ross x Ross 708 broiler hatching eggs were determined. The EST were recorded twice daily between 0 and 20 d of incubation (doi) using an infrared thermometer (IT). All eggs were candled at 12 doi. Subsequently, eggs containing live embryos (12 per level) were implanted with a transponder (TR) in the air cell. At 19 doi, TR were implanted in the cloaca of live embryos. The EST and ACT were recorded twice daily between 12 and 19 doi, and ACT and CT were recorded every 6 h between 19 and 21 doi. EST and ACT readings between 12 and 19 doi were positively correlated (r = 0.42; P ≤ 0.0001). Furthermore, their respective mean temperatures were 38.6°C and 38.8°C respectively, which differed significantly (P ≤ 0.0001). EST and ACT were not significantly influenced by tray level, doi, or time of day. Across the entire 19 to 21 doi interval, mean ACT (38.3°C) and CT (38.2°C) were not significantly different (P = 0.50) and were positively correlated (r = 0.28; P ≤ 0.01). These data suggest that ACT readings are higher than those of the eggshell during the last half of incubation, and that between 12 and 19 doi ACT can be used as an accurate measurement of broiler embryo core body temperature.
Chathurani Ranathunge, Gregory Wheeler, Andy Perkins, and Mark Welch  
Biological Sciences, Ph.D.  
The Role of Transcribed Microsatellites in Differential Expression of Genes in Natural populations of *Helianthus annuus* L. (Common sunflower) across a Latitudinal Cline

**Abstract:**  
Widely distributed common sunflower (*Helianthus annuus* L.) is a plant species native to the Americas. Its distribution across diverse habitats has made it an ideal model system to study the genetic basis of adaptation. In this study, natural populations of common sunflower from two latitudinal locations in Kansas and Oklahoma were grown in a common garden to test a potential role for transcribed microsatellites in regulating gene expression. An RNA Seq approach was used to obtain sequence data and gene expression estimates from four week old leaves. A differential gene expression (DE) study was carried out using R software based DESeq program to identify significantly up-regulated and down-regulated genes between the two latitudes. It was followed by a Gene Ontology (GO) analysis (Blast2GO) to discover the functional attributes of the identified DE genes. The sequences were then mined for the presence of microsatellites using the SciRoKoCo program. RNA Seq yielded 42.8 million average reads and DESeq identified 1521 significant differentially expressed genes (1299 up-regulated and 222 down-regulated in Kansas). The GO analysis identified functional annotations for 349 of these genes based on *Arabidopsis thaliana* protein database. SciRoKoCo revealed the presence of 1253 microsatellites in 696 unique gene sequences. A custom perl script identified trinucleotides as the most abundant (700) microsatellite motif type found within DE genes. The study provided an insight to the adaptive processes underlying heritable genetic variation and presented empirical evidence to test the role of microsatellites in regulating gene expression in natural populations of common sunflower.

Jonathan Stoll and Dr. Brent Frey  
Forestry, M.S.  
Stand development patterns for young planted oak stands on bottomland hardwood restoration sites

**Abstract:**  
Over the last several decades, bottomland restoration efforts have established hundreds of thousands of acres of planted hardwood stands in the Southeastern U.S. Past studies have focused greater attention on planting approaches and early growth and survival than on ongoing stand development and silvicultural options for these planted stands as they age. This study is investigating stand development, growth and biomass of 10-20 year old planted oak stands and the application of silvicultural treatments to improve their condition. An improved knowledge of stand development is needed to evaluate opportunities for silvicultural treatments aimed at improving the delivery of goods and services (e.g. wildlife, timber, carbon or water) from these stands. Study plots were put in on stands across the Lower Mississippi Alluvial valley and select trees were destructively sampled and analyzed for stem characteristics and biomass production. Early results of this study are indicating that artificially regenerated stands mature much differently and may need a different silvicultural methodology than traditional hardwood stands. An increasing demand for such knowledge by landowners is anticipated, particularly by those that have participated in Federal incentive programs for hardwood afforestation such as under the Conservation or Wetland Reserve Programs (CRP and WRP). Indeed, improving our knowledge of stand development, growth and yield, and silvicultural treatment options could prove critical for ensuring the continued commitment of landholders to the management of their hardwood plantings and ongoing participation in such programs.
Matthew Thornton and J. Brett Rushing
Agronomy, M.S.

Evaluation of Southeastern Wildrye's Tolerance of Imazapic

Abstract:
Southeastern wildrye (Elymus glabriflorus) is a native, perennial, cool-season grass that, until recently, has been relatively un-researched. Interest in this species as a forage is based on its somewhat high innate forage quality, prolific seed production, high seed germination rates, and its tolerance to open field plantings. Currently, native grass plantings consist solely of warm-season perennials such as big bluestem (Andropogon gerardii) and indiangrass (Sorghastrum nutans). Southeastern wildrye, if successful, could incorporate a cool-season component into these plantings allowing producers to extend their grazing season into late fall and early spring. However, prior to the widespread use of this species as a forage, there is a need for a reliable and weed free seed crop. Herbicides are the most efficient method in which to establish and manage such weed free stands of seed crops. To assess the tolerance of southeastern wildrye to imazapic, a field trial was established in Starkville and Newton, MS. Southeastern wildrye was planted at 20 lbs PLS/acre into 6’x10’ plots. Herbicide treatments included 0, 2, 4, 6, and 8 oz/acre applied in both pre- and post-emergent applications. Data collected included seedling counts, seedling heights, and percent weed control. In fall 2014 a 2 oz/acre rate of imazapic provided optimal growth and weed control while rates greater than 4 oz/acre reduced growth and vigor of seedlings

Chathurika Wijewardana, W. Brien Henry, Matthew Hock, and K. R. Reddy
Agronomy, M.S.

Interactive Effects of CO₂, Drought, and Ultraviolet-B Radiation on Corn (Zea mays L.) Growth and Development

Abstract:
Crop growth and development are highly vulnerable to global climate change components such as elevated carbon dioxide (CO₂), drought, and ultraviolet-B (UV-B) radiation. Interactive effects of these factors are clearly unknown to date. The objectives of this study were to test the hypothesis that corn hybrids differ in their response to multiple environmental factors of (CO₂) [400 and 750 µmol mol⁻¹ (+CO₂)], irrigation treatments based evapotranspiration (ET) [100 and 50% (-ET)], and UV-B radiation [0 and 10 kJ m⁻² d⁻¹ (+UV-B)]. Six corn hybrids (P1498, DKC 65-81, N75H-GTA, P1319, DKC 66-97, and N77P-3111) with known drought tolerance variability were grown in seven sunlit, controlled environment chambers in which control treatment consisted of 400 µmol mol⁻¹ [CO₂], 100% ET-based irrigation, and 0 kJ UV-B. Plants grown at +UV-B alone or combination with -50% ET produced shorter plants and smaller leaf area while elevated CO₂ treatments ameliorated the damaging effects of drought and higher UV-B levels on corn hybrids. Total stress response index (TSRI) for each hybrid, developed from the cumulative sum of response indices of vegetative and physiological parameters varied among the corn hybrids. The hybrids were classified as tolerant (P1498 and DKC 65-81), intermediate (N75H-GTA) and sensitive (P1319, DKC 66-97, and N77P-3111) to multiple environmental stresses. The differences in sensitivity identified among the corn hybrids imply the options for selecting hybrids with tolerance to multiple environmental stresses projected to occur in future climates.
Xue Zhang and Dr. Zee Haque
Food Science, Ph.D.

**OXYGEN RADICAL ABSORBANCE CAPACITY OF CHYMOTRYPTIC DIGESTS OF α-S2 CASEIN**

**Abstract:**
Alpha s2-casein is rich in π electron rich molecules, which can partake in aromatic interactions. We hypothesize that such interactions and resulting electronic continuity would enable antioxidants to more rapidly and forcefully quench electron lone-pairs of reactive oxygen species (ROS) by effectively donating electron. This study investigated the isolation of αs2-casein from bovine milk, standardization of its chymotryptic hydrolysis, fractionation of the hydrolyzates by size-exclusion high performance liquid chromatography (SE-HPLC), and antioxidative potential of resulted enzymatic hydralyzates. Crude αs2-casein was isolated from whole casein by a two-step 1-proponal-precipitation method. To hydrolyze protein chymotrypsin was used since it selectively cleaves the peptide-bond next to an aromatic residue, increasing the chances for inter-peptide aromatic-stacking effects. Five mg/mL of αs2-casein was hydrolyzed with chymotrypsin (50 μg/mL) for 5-60 min at 37˚C. The original protein exhibited complete hydrolysis within 5 min, evident from Tricine-SDS-PAGE results. Peptide profiles of hydrolyzates were determined by SE-HPLC using a Superdex Peptide 10/300 GL column and 30 % acetonitrile (v/v) as the eluent. Average molecular weight of each fraction was determined by comparing its retention time with those of molecular weight standards. Data depicted an inverse relationship between molecular weight and the duration of enzymatic hydrolysis. Average molecular weight of the smallest fraction at 5 min of hydrolysis was 981 Da, and it gradually reduced to 130 Da after 60 min of hydrolysis. All hydrolyzates had oxygen radical absorbance capacity (ORAC) values (2000-3000 μM TE) that were significantly (P<0.05) higher than that of the original protein (580 μM TE).

Oindrila Paul, Jessica Wilson, and Dr. Janet Donaldson
Biological Sciences, Ph.D.

**Determining the role of oxidative damage in bile salt induced damage to Listeria monocytogenes**

**Abstract:**
*Listeria monocytogenes* (*Lm*) is a Gram positive bacterium responsible for the foodborne disease listeriosis. To cause disease in humans, *Lm* must survive a variety of stressors encountered within the gastrointestinal (GI) tract, including variations in pH, oxygen availability, and bile. Though it is known that the stress response mechanism involves responding to oxidative stress induced by bile, little is known about the response under anaerobic conditions. Studies from our laboratory indicated membrane damage occurs in the presence of bile and damage is significantly different under anaerobic conditions. To further characterize damage observed, four *Lm* strains with variations of bile resistance were analyzed. To determine whether lipid peroxidation due to oxidative damage occurred, cultures exposed to porcine bile were treated with esculetin, a known antioxidant. Results indicated that esculetin did not improve the survival of *Lm* in the presence of bile, suggesting that the damage induced is not oxidative. Therefore, to determine if reductive stress occurred in *Lm* under anaerobic conditions, the NADH:NAD ratios were analyzed. NADH:NAD shifted under anaerobic conditions, but the effect is limited to bile sensitive strains. Fatty acid (FA) profiles of cell membranes were also analyzed. Saturated FAs palmitic acid and stearic acid increased under aerobic and anaerobic conditions, as well as the presence of unsaturated FA linoleic acid and oleic acid, following bile exposure. These results suggest that cell membrane modifications impact bile resistance and may impact reductive stress. Further research is needed to determine how the cell membrane modifications impact survival within the GI tract.
**Physics and Computations Sciences, Mathematics, and Engineering**

**Jamel H. Alexander** and Judy Schneider  
Mechanical Engineering, Ph.D.  
Possible Smart Carbon Nanotube/Fiber Reinforced Composites for Sensing Applications

*Abstract:*  
As the design of engineered products becomes more complex, ways to ensure the health during service are of interest. This is especially true when it comes to additive manufactured parts which can be made out of metal, polymers, or a composite. If transducers can be miniaturized, or even in some cases be part of the composite structure, this would provide a non-intrusive method for monitoring the structural health during the service life. Recent studies have shown that the addition of carbon nanotubes (CNT) between plies in a composite layup can be used to increase the interlaminar strength. This study investigates how these CNTs embedded in a carbon fiber (CF) reinforced polymeric composite maybe used to also provide strain sensing capabilities.

**Zhenghong Bao, Yongwu Lu, and Fei Yu**  
Biological Engineering, Ph.D.  
Methane reforming with carbon dioxide over Ni-based bimodal pore catalyst

*Abstract:*  
Bimodal pore NiCeMgAl catalysts were synthesized via the refluxed co-precipitation method. Methane reforming using carbon dioxide over this bimodal pore NiCeMgAl catalyst for syngas production was systematically studied by optimizing the active component NiO-loading, calcination temperature, reduction temperature and gas hourly space velocity (GHSV). The Ni15CeMgAl sample with 15 wt% NiO loading, was found to be active enough at 750 °C with a high CH4 conversion of 96.5%. The proper reduction temperature for the NiCeMgAl catalyst is either 550–650 °C or 850 °C. Higher calcination temperature favors the formation of NiAl2O4 and MgAl2O4 spinel structures. The Ni active sites derived from the NiAl2O4 spinel structure had longer stability than those from the free NiO. Compared with non-bimodal pore NiCeMgAl catalyst, bimodal pore NiCeMgAl catalyst has a longer stability in the feed gas without dilution. The large pores in the bimodal pore Ni15 CeMgAl catalyst were supposed to contribute to the quick molecule transfer during the dry reforming of methane (DRM) reaction when the GHSV was less than 96,000 h−1. The evolution of the Ni15CeMgAl catalyst before and after the DRM reaction was investigated by BET, XRD, TEM, and TGA techniques. A schema of the DRM reaction on the bimodal pore Ni15CeMgAl catalyst was proposed, and the correlation between the structure evolution and catalytic performance change was also discussed.
**Nonlinear behavior of ionically and covalently cross-linked alginate hydrogels**

**Abstract:**
Gels deform differently under applied load and the deformation behavior is related to their network structures and environmental conditions, specifically, strength and density of crosslinking, polymer concentration, applied load, and temperature. Here, we investigate the mechanical behavior of both ionically and covalent cross-linked alginate hydrogel using large amplitude oscillatory shear (LAOS) and cavitation experiments. Ionically-bonded alginate gels were obtained by using divalent calcium. Alginate volume fraction and alginate to calcium ratio were varied to obtain gels with different mechanical properties. Chemical gels were synthesized using adipic acid dihdrazide (AAD) as a cross-linker. The non-linear rheological parameters are estimated from the stress responses to elucidate the strain softening behavior of these gels. Fracture initiation and propagation mechanism during shear rheology and cavitation experiments will be presented. Our results provide a better understanding on the deformation mechanism of alginate gel under large-deformation.

**Wavelet Spectral Finite Element Based User-Defined Element in ABAQUS for Modeling Delamination in Composite Beams**

**Abstract:**
Wave propagation in a delaminated composite beam is investigated using the wavelet spectral finite element (WSFE) method. WSFE-based elements are implemented in Abaqus® through the user-defined element (UEL) option. Since Abaqus® operations can use real values only, all complex numbers in WSFE model are decoupled into real and imaginary parts and their real numbers are used in the computations. Final solution is obtained by forming a complex value using the two real number solutions. For modeling delamination, a beam is divided into two base-laminates (for parts of the beam without delamination) and two sub-laminates covering the delamination zone. Multi-point constraint (MPC) subroutine in Abaqus® is used to define the displacement relation between nodes of these four parts of the delaminated beam. Wave motion predicted by the UEL is validated with 2D finite element method (FEM) analysis using Abaqus®. The developed UEL largely retains computational efficiency of the WSFE method and extends its ability to model complex features (such as a delamination).
Mohammad Mahtabi and Dr. Nima Shamsaei
Mechanical Engineering, Ph.D.
Multiaxial Fatigue Modeling for Nitinol Shape Memory Alloys under In-Phase Loading

Abstract:
The realistic loading condition for many bio-implants is multiaxial arising from multidirectional loading or geometry complexities. In this study, some multiaxial stress-based classical and critical plane fatigue models are briefly reviewed and their application for martensitic Nitinol under torsion and in phase axial-torsion loading is evaluated. These models include von Mises equivalent stress, Findley model, McDiarmid model, and a proposed stress-based Fatemi-Socie-type model. As the fatigue cracks appear to be on the maximum shear plane for the martensitic Nitinol, all the models examined here consider the shear stress as the primary damage parameter. Among all the models considered in this study, the proposed Fatemi-Socie type model provides a better prediction for fatigue lives when compared to torsion and in-phase multiaxial fatigue experimental data from literature. Analyses indicate that critical plane approaches are more appropriate for multiaxial fatigue prediction of Nitinol alloys. Finally, recommendations are made to calibrate more reliable multiaxial fatigue models for Nitinol.

Ramakalavathi Marapreddy, Nicolas H. Younan, and James V. Aanstoos
Electrical and Computer Engineering, Ph.D.
An Innovative Approach to Detect Anomalies on Earthen Levees Using Unsupervised Classification of Polarimetric SAR Imagery

Abstract:
The loss of life and property associated with the catastrophic failure of dams and levees can be extremely high. Improved knowledge of the condition of these levees would significantly improve the allocation of precious resources to inspect, test, and repair the ones most in need. We used multi-polarized L-band synthetic aperture radar (SAR) to screen earthen levees for anomalies. The dynamics of surface and subsurface water events can lead to slope instability resulting in slough slides. SAR technology, due to its high spatial resolution and soil penetration capability, is a good choice to identify problematic areas on levees for this purpose.

To facilitate the analysis of scattering mechanisms using eigen decomposition, three features are defined as a function of the eigenvalues and the eigenvectors of coherency matrix [T]: (1) Entropy (H); (2) Anisotropy (A); and (3) alpha (α) for different scattering processes and identifying the dominant scattering mechanism. Using these H, A, and α parameters, we implemented several unsupervised classification algorithms for the identification of anomalies on the levee. Preliminary results reveal that the Wishart H/A/α classification method provides superior classification to the other unsupervised classification schemes for this application. The effectiveness of the algorithms is demonstrated using quad-polarimetric L-band SAR imagery from the NASA Jet Propulsion Laboratory’s (JPL’s) Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR). The study area is a section of the lower Mississippi River valley in the southern USA.
Mohammad Masoomi, Scott M. Thompson, and Nima Shamsaei
Mechanical Engineering, Ph. D.
Modelling, simulation and experimental validation of heat transfer in selective laser melting of the stainless steel

Abstract:
Among the different types of additive manufacturing (AM) processes for metallic part fabrication, Selective Laser Melting (SLM) has attracted significant attention in recent years. The SLM process utilizes a laser to selectively fuse adjacent powders within an inert powder bed that moves vertically to allow for layer-by-layer part construction based on a Computer Aided Drawing (CAD). Different sets of process parameters - such as laser power and wavelength, heat absorption in powder bed and powder particle size - will impact the mechanical properties of the final, post-SLM products. Process-related heat transfer and thermal gradients have a strong influence on the microstructural features of the part, which subsequently impacts its mechanical properties. In order to control the SLM process-related heat transfer, to ensure high quality parts with targeted microstructures and mechanical properties, comprehensive knowledge of the SLM process is required. In this presentation, a numerical simulation of the temperature distribution within and around parts being built via SLM is provided. In order to verify the data from simulation, and to estimate actual thermal gradients and heat transfer, experiments were separately conducted. In these experiments, thermocouples were used to measure the temperature response at specific locations in the built parts as well as the powder bed.

Gabe Monroe, Erick S. Vasquez, Zachary S. Aspin, John D. Fairley, Keisha B. Walters, Matthew J. Berg, and Scott M. Thompson
Mechanical Engineering, Ph.D.
Energy harvesting via ferrofluidic induction

Abstract:
A parametric series of experiments were conducted to explore the concept of ferrofluidic induction - a process for generating electrical power via cyclic oscillation of ferrofluid (iron-based nanofluid) through or around a solenoid. A peristaltic pump was used to pump aqueous ferrofluid, consisting of ~20 nm iron-oxide particles at a concentration of ~15 mg/mL. The flow was pulsed at 3, 6, and 10 Hz through 3.2 mm internal diameter plastic tubing. A 1000 turn copper-wire solenoid was placed around the tube 45 cm away from the pump. Results indicate that the ferrofluid is capable of inducing an electromotive force (giving a maximum +/- 30 uV potential across the solenoid) in the solenoid while being pumped, indicating the feasibility of ferrofluidic induction. This demonstrated process can be exploited to accomplish or enhance energy harvesting and/or conversion in a variety of applications.
Maryam Rahmani and Michael S. Mazzola
Electrical Engineering, Ph.D.

**Modeling of Common mode Currents on Electric Ship Hull Using Scattering Parameters**

*Abstract:*
A commonly encountered problem in modern ships is that of common-mode current. A method of discretizing a CAD rendering of a ship hull structure into an S-parameter model of the open-form conductor system it represents can satisfy the need for a tool that is computationally much easier to implement than existing finite-element methods. The approach taken is to discretize with component behavioral models, each derived from physics-based modeling, as opposed to discretization of the entire structure with difference equations and a spatial mesh. The behavioral model of the hull/bulkhead can be combined with other S-parameter models of equipment and lumped circuit elements like inductances and sources and then solved for voltages and currents (versus time or frequency) with standard circuits-aware software tools. This paper discusses the work-flow and validation by comparison to known electromagnetic solutions in the time-domain.

Chinthaka Ratnaweera, Manikanthan Bhavaraju, and Steven R. Gwaltney
Chemistry, Ph.D.

**Structure of lipid-bound human paraoxonase1 and identification of its open and closed conformations from molecular dynamics simulations**

*Abstract:*
Paraoxonase1 (PON1) is a calcium-dependent hydrolase associated with serum high density lipoprotein (HDL) particles. The primary biological function of PON1 is to hydrolyze lactones produced during lipid oxidation. This protein can also be used as a bio-scavenger for hydrolyzing nerve agents such as serin, soman, and VX. However, the rate of hydrolysis for such reactions is slow. Also, hPON1 exhibits an R192Q polymorphism, which can significantly influence the catalytic properties of the protein. Therefore, understanding the structural and mechanistic details of the different polymorphs of hPON1 is important. Hence, we computationally modeled the lipid bound hPON1 protein (since the crystal structure is currently unavailable) and conducted long time scale multi trajectory molecular dynamics (MD) simulations. The details of our hPON1 model and simulation protocol will be explained during the talk. Previous studies on recombinant PON1 identified that flexibility of the surface loop, which is close to the active site, leads to closed and open conformations. We started the MD simulations in the closed conformation, but some trajectories lead to open conformations. We identified an H-bonding interaction between Y71 and N183 in the closed conformation. However, these residues move far away from each other in the open conformation. In this talk I will discuss more structural properties of these two conformations and propose how the R192Q polymorphism can affect the formation of the closed and open conformations.
Shahirar Shahrokhabadi, Dr. Farshid Vahedifard, and Dr. Dov Leshchinsky
Civil Engineering, Ph.D.

Determination of Optimal Slope Profile under Static and Seismic Conditions

Abstract:
Maximizing the efficiency of a slope in construction and design is important to obtain reasonable factor of safety regarding geometrical constrains or to limit geometrical parameters at a specific factor of safety. In many practical problems the location of toe and crest are fixed and limited by the existence of nearby structures. In this case, the geometry of slope profile can maximize the overall stability of the slopes. In recent years, concave shape of forefront cross section of slopes has been introduced and it has been proved that both stability and resistance against erosion is more considerable when this kind of profile is used in design. In the current study, the efficiency of arc curve profiles are investigated in both static and seismic conditions. On one hand, the proposed simple formulation shows significant improvement in the economic convenience of a quarry excavation. On the other hand, the proposed shape of slope is considerably more stable than conventional planar profiles.

Brian Torries, Amanda Sterling, Nima Shamsaei, and Scott M. Thompson
Mechanical Engineering, M.S.

Tensile Properties of Ti-6Al-4V Manufactured by DLD Technique

Abstract:
This study investigates the tensile properties of Ti-6Al-4V specimens fabricated using Laser Engineered Net Shaping (LENS), a direct laser deposition (DLD) technique. Due to the cooling method and thermal history of LENS produced specimens, this additive manufacturing (AM) process can produce a different microstructure than that found in wrought Ti-6Al-4V. Therefore, LENS fabricated Ti-6Al-4V can possess different mechanical properties than wrought Ti-6Al-4V. Monotonic tensile tests were conducted on wrought, LENS fabricated, and heat treated LENS fabricated Ti-6Al-4V specimens, and a scanning electron microscope (SEM) was used to examine the resulting fracture surfaces in order to document any porosity or impurities. The LENS fabricated specimens were found to have a lower elastic modulus, engineering fracture ductility, and ultimate tensile strength (UTS) than the wrought material. Additionally, the heat treated LENS fabricated specimens were found to have a slightly lower elastic modulus than the LENS fabricated specimens, approximately the same UTS, and higher yield stress and engineering fracture ductility. The difference between the wrought and LENS manufactured specimens is due to the porosity present in the LENS samples, while the differences between the LENS and heat treated LENS specimens are expected to be due to the heat treatment eliminating the internal stresses present in the samples.
Social and Behavioral Sciences

Ashley A. Baker
Sociology, Ph.D.
For My Pastor Tells Me So: Mississippi Christians’ Views About Homosexuality and Gay & Lesbian Civil Rights

Abstract:
What do Mississippi Christians believe the Bible says about homosexuality? Is homosexuality an ultimate sin or not a sin at all? Should the church accept gays and lesbians fully or insist that they turn away from their “sin” before they can be considered truly Christian? In this study, I seek to understand what Mississippi Christians believe the Bible says about homosexuality and how they believe the issue should be dealt with in the church and in society at large. I show that whether respondents adamantly oppose homosexuality or believe that the church should welcome all people regardless of sexual orientation, most are unable to tell me specifically where the issue of homosexuality is discussed in the Bible. Instead, Mississippi Christians depend on the beliefs of their denomination or specific pastor/priest for guidance. I then examine how these religious beliefs influence Mississippi Christians’ views about gay and lesbian civil rights which are highly variable and ambivalent. I look at the diversity and nuances in Mississippi Christians’ opinions by specifically examining three issues: same-sex marriage, same-sex adoption, and beliefs about the gay and lesbian civil rights movement. These three issues demonstrate the range of beliefs surrounding the topic of gay and lesbian civil rights. I show that beliefs and attitudes about same-sex marriage and same-sex adoption fall largely along the lines of religious ideology. However, beliefs about the gay and lesbian civil rights movement seem less predictable.

Jaymes Durriseau, Jarrod Moss, Jonathan Cagan, and Pinzhi Chen
Psychology, Ph.D.
Understanding control and process-level activation during multi-attribute decision making

Abstract:
Decision making has been hypothesized to be made up of process-level and control-level operations. The process level integrates decision-relevant information, whereas, the control-level evaluates this information and allows a decision to be made. Previous studies have found that different brain regions are involved in the control-level and process-level operations. This study investigated the possible differences in process-level and control-level activity when making multi-attribute preference decisions between two vehicles with different visual and performance characteristics. The conflict hypothesis predicted that decisions with higher amounts of conflict would elicit higher control-level activation. The multi-representational hypothesis predicted that control level activity would differ for inter-representational conflict (conflict between visual and functional information) and intra-representational conflict (conflict within functional information). To test these hypotheses, participants made two-alternative preference decisions based on: (a) vehicle visual form information, (b) vehicle function information, or (c) a combination of both form and function. Sometimes one alternative was clearly superior (clear winner); sometimes there was not a clearly superior alternative (non-clear winner). In support of the conflict hypothesis, decisions with conflict (non-clear winner) showed significantly more control-level activation in areas related to decision conflict monitoring when compared to decisions without conflict (clear winners). These areas included the dorsolateral prefrontal cortex, anterior cingulate cortex, and the left anterior insula. In support of the multi-representational hypothesis, decisions based on visual information showed more neutral activity in the fusiform gyrus and the right middle occipital gyrus, which are areas associated with visuo-spatial processing, when compared to decision based on functional information.
Ismail Yigit  
Sociology, Ph.D.  
The Conflict between the Justice and Development Party and the Gulen Movement in Turkey

Abstract:  
This paper explores the recent era of Turkish politics, particularly the conflict between two strategic actors in Turkey: the Justice and Development Party (AKP) and the Gulen Movement (GM). The 17th and 25th of December 2013 are two days that are very important for the country’s recent political era, therefore we attempted to explore their relationships with each other and especially what happened one year after those two days. I aim to explain how these two strategic actors started to conflict. I examine the way in which these two actors collaborated and supported each other historically, and illustrate that these two actors were former allies. I explore how the AKP used its power against the GM, particularly by passing new education legislation, banning the GM affiliated newspapers in state operated airlines and institutions, and established a new English written newspaper. We examine three English written top newspapers that are distributed daily throughout Turkey; TodaysZaman, DailySabah, and HurriyetNews. Findings show how the GM affiliated newspaper TodaysZaman, the pro-government English written newspaper DailySabah, and the more liberal-elitist newspaper HurriyetNews covered the conflict. The results of the study show that while DailySabah covered the news about the AKP as a pro-government point of view in 2014, between 2010 and 2014 TodaysZaman attempted to construct a discourse against the AKP’s policies, and HurriyetNews located itself as in between these two actors.
Alexis Jones  
Cognitive Science, Ph.D.  
**Do We Treat False Memories the Same as True Memories?**

*Abstract:*  
Recently, the news reporter, Brian Williams, has been under fire by the media for claiming to remember an event that never happened (Parker-Pope, NY Times, 2015). Although the media claims that Brian Williams is lying—and that could be the case—many memory researchers suggest that he could very well be experiencing a memory for something that did not happen. Memory researchers have demonstrated the malleability and fallibility of memory, and have shown that many different factors can result in production of false memories. What is unclear is whether false memories are due to failures of memory monitoring, or metamemory.  

Metamemory is a cognitive process involved in the regulation and assessment of memory. Metamemory could play a role in the production of false memories by failing to assess that information at study is false (Mazzoni & Kirsch, 2002). The current study explored whether metamemory is sensitive to false versus veridical memories. Participants studied word pairs, such as FROG-LEG, and then their memory was tested for studied pairs (FROG-LEG), false memory pairs (FROG-GREEN), and control pairs (TABLE:CHAIR). Although participants’ recognition memory did not differentiate between studied and false memory word pairs, their metamemory predictions were lower for false memory pairs than studied pairs. The findings indicate a dissociation between metamemory and recognition memory, showing that perhaps correctly monitoring false memories protected against having a false memory.

Winston E. Jones and Jarrod Moss  
Cognitive Science, Ph.D.  
**Interruption-recovery training transfers to novel tasks**

*Abstract:*  
Interruption interference is a significant decrease in performance that follows task interruption. This interference is often studied using a primary and interrupting task pair. Evidence suggests that interruption interference can be reduced through practice by exposing individuals to many interruptions. However, the evidence that this skill transfers beyond the tasks being trained is less clear. In particular, these practice effects may only occur when the same interrupting/primary task pairs are involved. A transfer paradigm was implemented to assess the transfer of interruption-recovery skill. Participants in separate conditions performed either the Tower of Hanoi or the Tower of London primary task during a training block and a transfer block of trials. Trials were interrupted by another task, and the primary measure was the time taken to resume the interrupted task. Significantly lower resumption times at the beginning of the transfer block lead to the conclusion that interruption recovery skill can be transferred to a novel task.
Shelby L. McGrew, Daniel Gadke, and Carlen Henington
School Psychology, Ph.D.
Using Brief Experimental Analysis Procedures to Increase Sight Word Acquisition

Abstract:
Reading abilities in early childhood have been found to be significant predictors of gains in academic, social, and economic environments (Snow, C., Burns, M. S., & Griffin, P., 1998). Furthermore, early intervention has been found to decrease the likelihood of academic deficits. Extensive research has been conducted to identify effective interventions in increasing the reading ability of students with academic deficits. The present study used brief experimental analysis procedures to identify effective sight word interventions for five first grade students with reading deficits. Three interventions were compared across each of the students. The identified intervention was then implemented across a varying number of trials. Results indicated that the intervention was successful in increasing sight word acquisition for each student. Limitations and future research are discussed.

Leslie Moma, Bob Brzuszek, and Dr. Tim Schauwecker
Masters of Landscape Architecture (MLA)
Towards Biodiversity - a review of comprehensive plans (1976-2005) for Starkville, MS.

Abstract:
Biodiversity within the urban context is under considerable pressure as cities grow in order to support their expanding populations. One method to better understand the value of green infrastructure is through the use of a biodiversity index. The quantitative data provided by a biodiversity index adds depth to the conversation about biodiversity in the planning process.
The town of Starkville, MS was used as a case study for the City Biodiversity Index (CBI). The CBI is a planning tool that utilizes twenty-three indicators to evaluate three major themes: ecosystems services, native biodiversity, and levels of support within the municipal framework. A summary of the planning trends for Starkville from 1976 to 2005 was conducted in order to better understand the City’s progression towards inclusion of the environment in its planning process via comparison of the major themes of the CBI. In addition, a pilot study was conducted to assess biodiversity within the city parks using the framework prescribed by the CBI. For Starkville, our comparison revealed that the environment has not been factored into the planning process over the past forty years. Although long-range improvements, that subsequently benefit biodiversity, have been noted in comprehensive plans; the biodiversity assessment reveals low levels of biodiversity. The case study shows that inclusions of findings from the CBI illuminate opportunities and constraints that benefit ecology in the comprehensive planning process.
Andrew Tatch  
Sociology, Ph.D.  
**Global Scripts for Mental Health: Does Membership in World Society Influence the Provision of Mental Health Services?**

*Abstract:*  
This paper explores the field of international mental health. Utilizing World Polity Theory as a framework, analyses examine the role of duration in the greater international society on multiple indicators of mental health care on a global scale. World Polity would suggest that as duration in world society increases, member countries would be more likely to adopt modern methods of mental health care in the form of community based care and treatment in outpatient facilities. Using global data from the World Health Organization, I find mixed evidence of the role of world society membership on the provision of mental health care services. Providing support, it was found that as duration in world society increases, countries are more likely to have formal mental health policies and plans in place. As expected, increased duration in world society was also significantly associated with fewer mental hospitals (a more traditional form of care). However, increased duration was also associated with fewer outpatient facilities, considered a more modern form of care. Further analyses also examined the role of democratic governance in relation to country wide mental health care, with numerous significant associations discovered, including greater human resources and a greater government expenditure on mental health. Given the inconsistent and unclear associations, further research should continue to explore these relationships with more thorough and detailed statistical analyses to determine country level indicators that influence the provision of mental health care.

Sivas Vivekanandan, Dr. Robert Moore, Dr. Alan Morse, and Kenneth Graham  
Master of Business Administration and M.S. in Sport Administration  
**A Study of Electronic Service Quality on Fitness Firms: A Customer Perspective**

*Abstract:*  
Service quality has become a key tool for firms to develop a good long-term relationship with their customers, and hence, electronic service quality (ESQ) has become an essential tool for the good performance of a firm’s electronic channels. In addition to ESQ, customer orientation (CO) has become a key philosophy for companies to succeed in the competitive marketplace and is critical for developing long-term customer relationships. Thus, the purpose of this research was to study how customer orientation as perceived by the customers impacts their perception about the firm’s ESQ and to study the impact of this perceived ESQ on the outcomes at the customer level. There has been minimal research conducted on the components of service quality in the fitness industry despite the growth of this sector. Therefore, this research was focused on fitness firms in an attempt to find the impact of the ESQ from the customer perspective. A quantitative survey was conducted in order to collect the data, and regression analysis was used to test the validity of the proposed model. The participants for this study were the everyday gym goers. The findings showed that there is a positive influence from perceived CO towards perceived ESQ and a positive influence from perceived ESQ towards customer level outcomes such as customer satisfaction, customer trust and word-of-mouth. These findings therefore made the proposed model a valid one that can be used in decision making processes in business and marketing.
Poster Presentations

9:30 – 10:30

1. Hamed Bakhtiary, Anna E. Florence, Michael A. Murphy, Sunkwang Mun, Jun Laio, Lukeisha N. Williams, M. Horstemeyer, Michelle C. Laplaca, Raj Prabhu
   Biomedical Engineering, Ph.D.
   Strain Rate Dependency of the Intracellular Calcium Ion Concentration During Neuronal Membrane Mechanoporation

Abstract:
Traumatic Brain Injury (TBI) emergency department visits for football athletes are sited to be among the highest in sports. While sports gear and football helmet designs are being improved yearly, TBI related injuries in emergency departments has increased by 60%. Thus a better understanding of this phenomenon is required. During TBI, the threshold for homeostasis in the brain can be exceeded, creating strain on the neuronal cell membrane. Strain exceeding 2-4% may be accompanied by the creation of non-specific pores in the cell membrane with numbers increasing with strain rate. While pores generally reseal themselves, as a pore free cell membrane is energetically more favorable, the different composition between the intracellular and extracellular fluid allows for the diffusion of non-specific molecules down their respective concentration gradients. Specifically, the influx of calcium ions (Ca2+) into the cell results in damage. Using this knowledge background, different stress state simulations carried out on lipid bilayers, coupled with Fick’s diffusion law allow for the quantification of Ca2+ influx into the cell. Considering the different behavior of materials at the nanoscale and macroscale, atomistic simulations of different strain rate deformations were carried out to evaluate the strain rate sensitivity of intracellular Ca2+ concentration during mechanical insult to the neuronal cell membrane. It was found that while higher strain rates allow for faster mechanoporation, a smaller strain is required for mechanoporation showing the rate dependency of the cell membrane. Also a catastrophic increase in Ca 2+ is seen after the mechanoporation.
2. Amanda J. Cain, Dr. Caleb Lemley, Dr. Heath King, Dr. Kevin Walters, Dr. David Christiansen, Dr. Richard Hopper  
Veterinary Medical Science; DVM, Ph.D.  
**Season and Pre-breeding Management Affect Late Gestation Uteroplacental Hemodynamics in Beef Heifers**

*Abstract:*  
The objective of the present study was to evaluate the effects of heifer management and season on uteroplacental hemodynamics of nulliparous beef females. To this end, fall- and spring-calving beef heifers developed on either a low input (LOW) or conventional (CON) heifer development scheme were bred at age 15 months. Body weight (BW) was assessed monthly. Doppler ultrasonography was used to assess blood flow (BF) metrics of uterine arteries during late gestation. Arterial diameter (AD) and BF were evaluated for both uterine arteries, and total blood flow (TBF) was calculated as the sum of both. Main effects of season and gestational day were observed on contralateral BF, and there was a season*day interaction on ipsilateral BF. There was a season*day interaction on TBF whereby TBF increased as gestation progressed and spring-calving heifers displayed increased TBF. When adjusted for BW, an additional main effect of treatment was observed in which LOW heifers had increased TBF compared to CON heifers. There was a main effect of day and a treatment*season interaction on contralateral AD. There was a main effect of treatment and a season*day interaction on ipsilateral AD in which AD increased as gestation progressed. LOW heifers displayed increased AD compared to CON heifers, and spring-calving heifers had greater AD than fall-calving females. It was concluded that developing replacements with low input management does not yield compromised uteroplacental hemodynamics compared to traditionally developed females when nutrition during gestation is adequate. Furthermore, spring-calving heifers have increased uteroplacental BF compared to their fall-calving counterparts.

3. John Clune, Dr. Steven Elder  
Biomedical Engineering, M.S.  
**Development of a Decellularized Osteochondral Xenograft Using EGCG as a Chemical Crosslinker**

*Abstract:*  
Currently, articular cartilage defects are treated with either autologous chondrocyte implantation or osteochondral allograft transplantation. These both have serious drawbacks such as limited availability of grafts, multiple surgeries required, and prolonged recovery time. This research will give an alternative to the currently used cartilage repair and regeneration techniques. Epigallocatechin-3-gallate (EGCG), a plant-derived catechin obtained from green tea leaves, will be used to crosslink decellularized porcine osteochondral xenografts in order to restore lost mechanical and biological properties due to the harsh decellularization process. Similar to other plant-derived chemicals, genipin and proanthocyanidin, it is believed to be responsible for restoring mechanical properties and aiding in collagenase resistance. Currently, EGCG has been shown to increase compressive resistance while maintaining similar stress relaxation to native tissue. A significant increase in intermolecular crosslinking with EGCG has been shown through a ninhydrin assay and is proportional to the concentration of EGCG crosslinker. Preliminary collagenase-resistance tests has shown EGCG to significantly lengthen the amount of time it takes to completely dissolve. A Five-day cell contact test has indicated this method of chemically crosslinking osteochondral xenografts is non-cytotoxic and allows migration of living cells into the tissue. Compared to other methods of crosslinking collagen such an UV light exposure, Vitamin B2, and glutaraldehyde, EGCG is a less expensive alternative, more readily available, non-cytotoxic and completes crosslinking quicker.
4. Jordan Craft, Dr. Christian Baldwin  
Agriculture with an emphasis in Agronomy, M.S.  
**Affects of DryJect and Hollow Tine Aerification on Ultradwarf Bermudagrass**

**Abstract:**  
Aerification leads to substantial damage to the golf course putting green playing surface which results in prolonged recovery. The demand for high quality playing conditions year round requires an aerification practice that is less disruptive. Therefore, objectives of this research were to determine the right combination of new DryJect (DJ) technology with modified traditional aerification programs to achieve minimal surface disruption without a compromise in soil physical properties and playability. The research was conducted at the Mississippi State University Golf Course practice putting green on a USGA (United States Golf Association) specified ultradwarf bermudagrass (Cynodon dactylon L.) cultivar, ‘MS Supreme’. Treatments were arranged in a split block, randomized block design with 3 replications. Treatments included various combinations of 1.27cm (HT1.27) and 0.64cm (HT64) diameter tine sizes and DJ from June to August. Data collection included surface firmness, hydraulic conductivity, bulk density, chlorophyll index, normalized difference vegetative index, thatch depth, volumetric soil water content (3.81 and 12.20cm depth), and percent recovery. Fourteen days after treatment (DAT) in July, HT64 + two DJ treatments had the firmest surface while HT1.27 had the softest surface. In July, DJ treatments had 95% greater recovery 7 DAT, while HT1.27 had the slowest recovery. At the final data collection date (121DAT), HT1.27 and HT1.27+DJ July had the lowest thatch depth and bulk density values. Results indicate DJ treatments reduced recovery time while having minimal impacts on physical soil properties compared to the HT1.27 treatment.

5. Joshua Grant, C. LaShan Simpson  
Biomedical Engineering, M.S.  
**A Model for Vascular Calcification Towards Osteoclast-Mediated Therapy for Arteriosclerosis**

**Abstract:**  
Medial vascular calcification is a condition in which hydroxyapatite mineral deposition occurs in the medial layer of the artery. The vascular smooth muscle cells (VSMCs) in the artery walls are transforming to an osteoblast-like phenotype resulting in mineral deposition like bone formation. In healthy bone remodeling, osteoblasts deposit mineral and osteoclasts resorb mineral based on biological cues. We plan to take advantage of this physiological similarity and resorb arterial mineralization using osteoclasts. First, it is necessary to develop an in vitro model for vascular calcification. The presence of high phosphate in cell culture medium has exhibited osteoblastic differentiation of smooth muscle cells in literature. In this study, the effects of high phosphate from four sources was investigated. To initiate in vitro calcification, VSMCs were cultured in standard growth medium supplemented with 3.0 mM inorganic phosphate (Pi) from either monobasic sodium phosphate, dibasic sodium phosphate, β-glycerophosphate, or potassium phosphate. After 1, 3, 7, and 14-day time points, cell layers were decalcified using 0.6 N HCl. HCL supernatants were analyzed for calcium content using Atomic Absorption Spectroscopy and normalized to protein content using BCA Protein Assay. Statistical significance was determined by student’s t-test using a p-value of 0.05 as the significance level. After 14 days, all groups were significantly higher than the control group receiving only growth medium with respect to calcium deposition. However, both monobasic and dibasic sodium phosphate were shown to have significantly higher calcium content than both β-glycerophosphate and potassium phosphate at 7 and 14 days.
6. Jillian Harris, Vincent Klink
Biological Science, M.S.
Examining the Effects of Overexpressing Candidate Resistance Genes in Glycine Max in Relation to Infection with the Nematode Heterodera Glycines (Soybean Cyst Nematodes)

Abstract:
Glycine max (soybean) is ranked as the world's 6th most important crop with 315.1 million tons produced in 2014. The most important pathogen of soybean is Heterodera glycines (soybean cyst nematode {SCN}), causing 7-10% loss in production worldwide (1 billion dollars) by reducing root function and stunting shoot growth. SCN parasitizes a specific root cell known as the pericycle, resulting in the formation of a nurse cell called a syncytium from which it feeds. The syncytium is also the site of the resistant reaction. To understand the molecular machinery that relates to resistance, syncytia undergoing susceptible or resistant reaction were collected by laser microdissection. Illumina deep sequencing of RNA samples identified 1,787 genes that were active specifically during resistance. Candidate resistance genes were genetically engineered into soybean and analyzed to determine if the functioned in resistance. A screen of 151 genes resulted in the identification of genes that play roles in resistance. The work has led to a better understanding of the cellular processes that underlie resistance.

7. Md Shamim Howlader, Dr. Todd French, Dr. Hossein Toghiani
Chemical Engineering, Ph.D.
The Solubility of Carbon Dioxide in Triglycerides: A Preliminary Study for Cell Disruption Using High Pressure Carbon Dioxide

Abstract:
Economical and sustainable biodiesel production is very dependent on non-food sources of triglycerides (e.g. microbial oils). MSU has developed a process for the production of triglycerides from lignocellulosic biomass (yard waste, energy crops, etc.) via triglycerides-accumulating microorganisms. One of the challenges of this biodiesel feedstock production is a less energy intensive triglycerides extraction process. This study investigated the use of in situ gas explosion to lyse the triglycerides-rich cells. The process involves the solubilization of a gas (e.g. carbon dioxide) under pressure followed by a rapid decompression which allows the gas that is in the cell to rapidly expand and rupture the cell from the inside out. The solubility of carbon dioxide in water, and triglycerides was investigated in this research, which begins the understanding of the mechanisms of cell disruption. The Peng-Robinson Equation of State was used to calculate the CO2 solubility. A central composite design (CCD) was used to analyze the data. The solubility in triglycerides was found to be higher than that of pure water. A preliminary study of the cell disruption was conducted at a pressure of 1930 kPa. Scanning electron microscope (SEM) was used to visualize cells before and after the disruption. The pressure was applied five times and the cell structure was compared at time zero and after the fifth run. Ruptures in the cell wall was observed after the fifth run, which indicates the potential of this process to release triglycerides from these cells and decrease extraction cost for this biodiesel feedstock.
8. Laya KhademiBami, Bebood Mohebby
Department of Sustainable Bioproducts, Ph.D.
Bioreistance of Poplar Wood Compressed by CHTM Process

Abstract:
Bioreistance of treated Poplar wood by CHTM process (Combined-Hydro-Thermo-Mechanical Wood Modification) was studied in the current research work. Resistance against brown rot fungus Gloeophyllum trabeum as well as the soft rot decay was the main concern of this work. Poplar wood blocks were hydrothermally treated at temperatures of 120, 150 and 180°C for holding time of 0, 30 and 90 min. afterwards, the blocks were compressed at temperatures of 160 and 180°C for 20 min. The treated blocks were oven dried for 24 hours at 103±2°C. Small specimens were cut from the blocks and exposed to the brown rot fungus according to EN 113. Also, mini-stakes were prepared and exposed to soil according to ENV 807.

Results revealed that the bioreistance of the CHTM treated poplar wood increased due to the hydrothermal modification. Increase of the holding time as well as the press temperature reduced the fungal activity in the CHTM treated wood. According to the results of previous and the current works, the treated wood at temperature of 150°C for a holding time of 30min and compressed at press temperature of 180°C was selected as the best treatment.

9. Bahareh Kokabian, Dr. Veera Gnaneswar Gude
Civil and Environmental Engineering, Ph.D.
Nutrient Removal Biocathodes in Microbial Desalination Cells

Abstract:
Discharge of nitrogenous compounds from municipal and industrial wastewater effluents is of major concerns of today’s world since it has negative effects including eutrophication and hypoxia in water bodies. In addition, an ongoing challenge to sustainability of wastewater treatment systems is to improve the energy efficiency and cost effectiveness in removing nutrient compounds. A solution to this challenge would be to use bacteria that are capable of removing nutrient from wastewater in devices called Microbial Desalination Cell (MDC). MDC is a promising technology which allows for simultaneous wastewater treatment and desalination of saline water with concurrent electricity production and nutrient removal. Exoelectrogenic bacteria in the anode oxidize organic matter while autotrophic bacteria serve as biocathode to remove nutrients in the cathode chamber. Autotrophic bacteria used in this study involve micro algae that remove nutrient through photosynthetic reactions (PMDC) and Anammox bacteria which are capable of removing ammonia by anaerobic ammonia oxidation (ANXMDC). PMDC could remove up to 90% of nitrogen in the form of nitrate while 20 % of phosphorous in the form of phosphate was removed in the continuous mode algae flow. The ANXMDC produced 0.0896 V while 100% of ammonia (NH3 as ammonium) and 88% of nitrite were removed from the cathode chamber with desalination efficiency of 53.66%. Our results demonstrate that effective batch acclimatization experiments enhanced electricity generation along with nitrogenous compound removal and desalination. This study shows that this system has potential for sustainable and cost effective treatment of nutrient removal and energy recovery from wastewater.
10. **Katy Limpert**, Courtney Siegert, Sasith Karunarathna
Forestry, M.S.
**Ecological Significance of Phyllosphere Leaf Traits on Throughfall Hydrology, Biochemistry and Leaf Litter Among Quercus Species in the Southeastern United States**

*Abstract:*
*Quercus* (oak) is a dominant species in many forest ecosystems across the United States that contribute vital ecosystem services through water and nutrient cycling. Given, the prevalence, persistence, and diversity of *Quercus* leaves in forest ecosystems, it is likely that this species strongly mediate nutrient cycling when present. The objective of this study was to determine the (1) interspecific temporal distribution of *Quercus* leaf fall and (2) quantify canopy-derived nutrients contributed to forest ecosystems in an oak-hickory forest in Mississippi. Beginning in Fall 2014, canopy litterfall was collected weekly to quantify changes in canopy leaf area index (LAI) and timing of species-specific leaf fall rates. Throughfall quantity and chemistry were measured during individual storm events under each of the five focal *Quercus* species and two non-*Quercus* species.

During the winter, *Q. shumardii* had the highest leaf retention although non-oak species had a higher leaf retention in general. *Quercus shumardii* also had the lowest average C:N amounts (43.99 mg L\(^{-1}\)) in leaf litter content compared to the other *Quercus* species. Non-oak species had a considerably lower average C:N ratio (*Carya* spp. 32.58 mg L\(^{-1}\)) which positively correlated with longer leaf retention. As leaves were lost, throughfall depths generally increased in all species but were highest in *Q. shumardii, Q alba,* and *C. glabra.* The average total nitrogen content of throughfall was highest in *Q. shumardii* (1.44 mg L\(^{-1}\)) and *Q. stellata* (1.65 mg L\(^{-1}\)) compared to other *Quercus* and non-*Quercus* species.

11. **Xiaoxi Meng**, Zhaohua Peng
Biochemistry, Ph.D.
**Mapping Rice Nutrition Synthesis Genes by MutMap Method**

*Abstract:*
The nutritional health and well-being of humans is dependent on plant foods either directly or indirectly as plant foods provide almost all essential vitamins, amino acid, minerals and a number of other health-promoting phytochemicals. This research is under way to find out genes which manipulate synthesis of nutrients in order to improve rice nutritional quality.

MutMap is a method based on whole-genome resequencing of pooled DNA from a segregating population of plants that show a useful phenotype. In MutMap, a mutant is crossed directly to the original wild-type line and then selfed, allowing unequivocal segregation in second filial generation (F2) progeny of subtle phenotypic differences. Also, MutMap method can accelerate the identification of genes that cause agronomically important traits in mutant lines and speed up the genetic improvement of rice and other crops.
**12. Sunil, Dr. Brent R. Frey, Dr. James Henderson**  
Forest Resources, M.S.  
**Silviculture and Economics of Even and Uneven Aged Management of Bottomland Hardwood Forest in Lower Mississippi Alluvial Valley**

*Abstract:*  
Bottomland hardwood management approaches differ in large degree depending on their objectives, whether focused on timber, wildlife or other values. Today, timber-focused management regimes typically apply even-aged forest management aimed at promoting optimal growth of desirable tree species (e.g., ash, red and white oaks). In contrast, wildlife-focused management approaches tend to prioritize structural diversity. For this purpose, managers often gravitate to uneven-aged forest management, which are considered by some to produce better habitat for wildlife. Objective of this study is to explain the economic tradeoffs of even- and uneven-aged management and/or timber- and wildlife-centric management for bottomland hardwood forest. Data of different hardwood species will analysis by using Forest Vegetation Simulator (FVS) software developed by USDA Forest Services. Additional projection will also be simulated using the hardwood growth and yield model developed by Mississippi State university scientists. Predicted data will be calculated with dollar value to calculate the overall return form the different management regime. Comparative study of these two strategies in terms of the economic return based on timer production value would help managers and landowners to make informed management decisions for their stand conditions and management objectives. Predicted economic return of bottomland hardwood forest management would help landowners and managers choose between even- and uneven-aged management and allow them to understand how much economic gain or loss they would realize by adapting an alternative form of management.

Computational Biology, Ph.D.  
**BIRAP: Bacterial Intergenic Region Analysis Pipeline for Structural Annotation Using RNA-seq and Proteogenomics**

*Abstract:*  
Although insilico methods have accelerated gene discovery, several shortcomings in sequencing and annotation process have led to assimilation of errors in annotation. It is imperative, when feasible, to conduct structural annotation i.e. identification and demarcation of boundaries of all expressed elements in a genome sequence, using experimental data. Analysis of expression in annotated intergenic regions is an important aspect of experimental annotation, as it focuses on elements not identified by computational approaches. Here, we describe bacterial intergenic region analysis pipeline (BIRAP) that incorporates expression profile from RNA-seq and/or proteomics to validate and update existing structural annotation of bacterial genomes. For RNA-seq data, BIRAP requires ‘mpileup’ output from SAM tools. BIRAP normalizes the expression profile across samples and does a binary transformation of expression and validates existing annotation. For proteomics data, the tool requires an output from any proteogenomic mapping tool (.gff) containing the loci of all expressed peptides. The output from BIRAP includes sequences of expressed intergenic regions in Fasta format and coordinates of expressed intergenic regions and their relationship to existing annotation (if any). Sequences can be searched against Blast database to identify novel protein coding regions and coordinates of expressed regions can be easily translated into other formats for visualization with tools such as IGV or Artemis. When the end user provides coordinates of promoters and terminators in the genomes, the tool will also analyze expressed intergenic regions to identify putative non-coding RNA. This tool is implemented in Perl and is available here: https://sourceforge.net/projects/birap/
14. Oludare Sam, Dr. Randall J. Rousseau, Landis B. Herrin, Jason C. Mack  
Forestry, M.S.  
**Potential Gains from Breeding and Selection of Eastern Cottonwood and Hybrid Poplars on Lower Mississippi Alluvial Floodplain and Upland Sites**

**Abstract:**  
Populus is a genus of exceedingly fast-growing trees, with high rates of production, physical characteristics, and tremendous potential for sawtimber, pulpwood, and as a source for renewable, biomass energy. Susceptibility of most hybrid poplars to fungus diseases, and the fact that the productivity of the Populus species is known to have a wide variation across different climates and soil types, has been noted to be a great factor hampering their adequate productivity. In spite of these, capturing Populus maximum productivity for potentials actualization, demands significant effort in the aspect of tree improvement, selection exercise, and adequate silvicultural practices. The study determines the growth rates, adaptability to different environments, and disease resistance of selected eastern cottonwood and hybrid poplar clones on alluvial and upland sites over a four year period between 2010 and 2013, using plant materials of different taxa from four different sources. The results from the 2010 and 2011 trials on the upland site at Pontotoc, MS., showed nine hybrid poplar clones that performed well through age three. The results also established that eastern cottonwood clones performed better than hybrid poplars in term of growth and disease resistance on the alluvial site located in the lower Mississippi Alluvial Valley (LMAV) near New Madrid, MO. These results suggest that eastern cottonwood growth on the uplands is dramatically reduced as expected when compared to alluvial sites, while the susceptibility of hybrid poplars to Septoria disease remains an issue, even at early ages of one to three years.

15. Wenjie Shao, Dr. Zahur Zee Haque  
Food Science, M.S.  
**Fractionation and Capillary Electrophoretic Patterns of Chymotryptic Digests of Sodium Caseinate**

**Abstract:**  
Hydrophobicity of peptides, which are naturally antioxidative, drives their localization in oil/water interfaces potentially enhancing scavenging of lipid-derived radicals through proximity facilitated electronic interactions. In an effort to obtain hydrophobic peptides for use in subsequent antioxidative studies, this study investigates bulk fractionation of crude enzymatic digests of freshly prepared sodium-caseinate rich in aromatic amino acids that potentially offer electronic conductivity through pi-orbital stacking. Fresh unhomogenized milk was obtained from the Mississippi State University dairy herd, acidified to pH 4.6 using 1M lactic acid, and centrifuges at 6000 RPM at 20°C for 20 minutes to collect the calculated casein that was re-dispersed with constant stirring for two hours in deionized water (ratio 1:11, w/v) adjusted to pH 6.6 with 10 N NaOH. The sodium-caseinate dispersion was lyophilized to obtain a free flowing powder that was hydrolyzed using α-chymotrypsin at an enzyme to protein ratio of 1:200 (w/w) (pH 8) for 60 min at 37°C. The hydrolysis was stopped by adjusting the pH to 2 and immediate freezing at -20°C. Aliquots were loaded on to a XAD-16 preparative column, pre-equilibrated with 10mM n-ethylmorpholine/acetate buffer (pH6), at a concentration of 30 mg/mL (w/v). Elution was with buffer containing step-wise increase in the percentage of added ethanol (from 30% to 95%, gradiently). Capillary Electrophoresis was carried out to determine absorbence at OD214nm and OD280nm of each fraction. Data showed multiple peptide components in each fraction. The fractions were analyzed for their antioxidative activity and persistence to be presented in a subsequent report.
16. Sara A. Shields-Menard, Marta Amirsadeghi, Rafael Hernandez, Janet R. Donaldson, Todd French
Biological Sciences, Ph.D.
From Waste to Biodiesel: Model Phenolic Lignin Compounds Affect Lipid Accumulation in the
Oleaginous Bacterium Rhodococcus Rhodochrous

Abstract:
Lignocellulosic biomass is the most abundant and renewable organic material in the world. The
lignocellulosic complex is composed of cellulose, hemicellulose, and lignin, which can be pretreated to
release sugars from the complex, and often recalcitrant, lignin polymer for microbial fermentation.
Oleaginous microbes can accumulate over 20% of their cell dry weight as lipids that are stored as
intracellular energy reserves. The characterization of other oleaginous bacteria creates opportunities for
the development of alternative feedstocks and technologies. Rhodococcus rhodochrous is a bacterium
recently determined to be oleaginous when grown in glucose-supplemented media. The purpose of this
study was to evaluate model lignin phenolic compounds as substrates for lipid accumulation. Shake-flask
experiments were performed using phenol, 4-hydroxybenzoic acid (HBA) and vanillic acid (VA) as
model lignin compounds with and without glucose as a co-substrate. Samples were taken daily and lipids
were extracted from a freeze-dried pellet using a modified Bligh and Dyer method. R. rhodochrous
accumulated over 40% of cell dry weight as lipid when grown in glucose with HBA and VA, but less than
20% when grown in HBA and VA without glucose. When grown in phenol and glucose, R. rhodochrous
accumulated 35% lipid, but did not accumulate lipid when grown in phenol alone. Cell dry weight
increased significantly in all treatments suggesting R. rhodochrous could survive and grow in phenol,
HBA and VA alone or with glucose as a co-substrate. Future research will aim to optimize culture
conditions of lignocellulosic compounds for growth and lipid accumulation by R. rhodochrous.

17. Rakish Shrestha, Jutima Simsiriwong, Nima Shamsaei
Mechanical Engineering, Ph.D.
Effects of Strain-Control and Load-Control Modes on the Fatigue Behavior of PEEK and Fatigue
Life Modeling

Abstract:
In this study, the effects of two different types of control modes (strain-control and
load-control) on the fatigue behavior of polyether ether ketone (PEEK) are investigated.
PEEK is a thermoplastic polymer that is commonly used in automotive, aerospace, and medical
applications, due to its excellent mechanical properties as well as chemical and corrosion resistance. As
the state of cyclic loading of PEEK components in these applications can be either under constant strain
or constant load, it is important to understand the test control mode effects on the fatigue behavior to
accurately predict fatigue life of PEEK. The experiments are performed on cylindrical dog bone shaped
PEEK specimens under uniaxial fully-reversed strain-controlled condition at five strain amplitudes (2%,
2.5%, 3%, 3.5%, and 4%) at various frequencies. Results show that the fatigue life at lower strain
amplitudes decreases as the frequency increases, whereas, at higher strain amplitudes, the fatigue life
increases as the frequency increases. The load-controlled fatigue tests are then performed utilizing the
applied load that corresponds to stress responses obtained from the strain-controlled tests. Three different
types of fatigue models including a strain-based (Coffin-Manson), strain- and stress-based (Smith-
Watson-Topper), and energy-based are employed. Among the three fatigue models, the fatigue life
prediction using the energy approach is found to provide a better correlation to experimental data when
compared to the Coffin-Manson or Smith-Watson-Topper model.
18. **Amanda J. Sterling**, Brian Torries, Dr. Nima Shamsaei, Dr. Scott Thompson  
Mechanical Engineering, Ph.D.  
**Process Defect and Fatigue Behavior of 3D Printed Ti-6Al-4V**

**Abstract:**  
Fatigue behavior of Ti-6Al-4V specimens, fabricated using the Direct Laser Deposition (DLD) technique called Laser Engineered Net Shaping (LENS), is investigated in this study. This additive manufacturing (AM) method may produce a different microstructure than that of the more traditional wrought Ti-6Al-4V, due to the unique time-temperature history of the process. Because the microstructure of a material affects that material's mechanical behavior, LENS fabricated Ti-6Al-4V may have different properties than wrought Ti-6Al-4V. Fully reversed strain-controlled fatigue tests were conducted on a series of specimens for wrought, LENS, and heat treated LENS fabricated Ti-6Al-4V. A Scanning Electron Microscope (SEM) was used to examine the fracture surfaces of the fatigue specimens to determine the failure mechanism, crack initiation site, and to document any visible impurities. The fatigue lives of the LENS produced specimens were found to be much shorter than those of the wrought specimens, and the selected heat treatment schedule imposed upon the LENS samples did not improve the fatigue behavior. This was due to, in large part, the presence of porosity in the LENS fabricated material, which played a large role in dictating the failure behavior.

Veterinary Medical Sciences, Ph.D.  
**Microbiota of the Nasopharynx of Diabetic Obese Mice and the Risk of Carriage of Streptococcus Pneumoniae**

**Abstract:**  
Streptococcus pneumoniae is a gram positive diplococci that is responsible for more than 1 million deaths per year and is most commonly associated with diseases such as pneumonia, meningitis, bacteremia and otitis media. Usually inhabiting the upper respiratory tract of humans as a harmless commensal, pneumococci have the ability to translocate to different anatomic sites within the host and cause disease through mechanisms that are still unclear. Individuals with chronic diseases such as type 2 diabetes have an increased risk for pneumococcal disease. In this study we look at diabetic obese Leprdb/db mice and pneumococcal nasopharyngeal carriage and systemic disease. We also investigate the effects of type 2 diabetes on the microbiota of the nasopharynx (NP) by applying culture-independent 16S rDNA sequencing to bacteria in the NP. Although diabetic mice suffer greater mortality with systemic disease, they carry pneumococcus less well in their nasopharynx. Data from the 16S sequencing show that the diabetic mice have an abundance of Lactobacillales, specifically in the family Streptococcaceae as compared to normal mice. The microbiota of diabetic obese mice may reduce the capacity to carry pneumococci in the NP. Future studies may lead to the manipulation of the nasopharyngeal microbial population as an effective way to prevent pneumococcal disease.
Mechanical Engineering, Ph.D.
Mechanical and Microstructural Properties of Lens-Produced 316L Stainless Steel

Abstract:
This study will focus on the mechanical properties and microstructural features of laser-deposited 316L stainless steel, their dependence on manufacturing parameters and their competitiveness with conventionally built materials. The topics investigated are the effects of different thermal histories during fabrication as well as heat treatment on the mechanical (i.e. tensile, compression, and microhardness) and microstructural (i.e. grain size and morphology) characteristics of LENS-produced specimens. The results showed that yield and ultimate tensile strengths of LENS-produced 316L SS are higher than cast and wrought materials. Lower ductility of LENS-produced samples can be improved by heat treatment. The time interval (i.e. the amount of time that takes for the laser beam to print the next layer) during fabricating has a substantial effect on thermal history, microstructure evolution, and mechanical properties of LENS-produced 316L SS. A longer time interval between deposited layers increases the cooling/solidification rate of each layer, which leads to finer microstructure and higher strength as well as lower elongation to failure. Conversely, a shorter time interval between deposition of layers decreases cooling rate and increases tempering temperature resulting in a coarser microstructure, lower strength, and larger elongation to failure. In addition, a longer time interval also is responsible for increasing porosity (i.e. trapped gas) and week metallurgical bonding between layers during fabrication due to high solidification rate of each layer and lower penetration of laser depth.

21. Jingyi Yan, Zahur Haque
Food Science, M.S.
Influence of Dispersed Phase Hydrophobicity on Nano-globule Stability

Abstract:
Bovine serum albumin (BSA) has been used as an emulsifier (E) to stabilized nano-globular dispersions and works significantly better when a small non-polar surfactant is used as a co-emulsifier (CE) in a mixed stabilization system (MSS). This study investigates the effect of alteration of hydrophobicity of the dispersed phase and its volume fraction (φ) and weight percentage of CE to E in the MSS on stability of nano-globular dispersion generated by Ultra-High Pressure Homogenization (UHPH) at 140MPa, 210MPa, 280MPa. Three short chain fatty acids (SCFA), butyric (C4) (smaller hydrophobic chain, hexanoic (C6)(larger hydrophobic chain) and octanoic acids (C8) (larger hydrophobic chain than C6 ) at φ of 0.1, 0.2 and 0.4, were use. The E (0.01, 0.02, 0.04, 0.08%, 0.4%, 0.6% and 0.8% (w/v)) and CE, (Tween 20) were dispersed separately in 10mM ammonium acetate/acetic acid buffer (pH 6.0) and mixed prior to Ultra-High Pressure Homogenization (UHPH) to obtain MSS with CE content of 0.5, 1.0, 4.0, 8.0 % (w/w E) compared to E at all it concentrations. Results indicated a marked enhancement of stability of the nanoemulsion at 25°C in nano-emulsions containing less hydrophobic C4 in MSS comprising of 0.4% (w/v) E and 1% (w/w E) CE with φ being 0.4. With C6, where the hydrophobicity was greater than C4 and C8, the CE percentage to E had to be markedly increased to 8%, (w/w E), where Data provided valuable clues for the development of stable nano-vesicular emulsion systems for considerably efficient delivery of nutraceuticals and/or drugs.
Temperature and Time Effect on the Physical and Chemical Properties of Pyrolysis Oil

Abstract:
Pyrolysis oil is a promising sustainable energy source causing no greenhouse gas emission. However, the drawbacks such as high reactive oxygen content, high acidity, chemical and thermal instability during storage hinder its direct usage as transportation fuels. Catalytic upgrading technologies have been proven to be effective in improving the stability and quality of the oil. The “aging” reactions compete with the desired catalytic cracking, hydrotreating and steam reforming reactions. The “accelerated aging” method, i.e., isothermal treatment in the absence of catalysts was used to evaluate the changes in the properties which will contribute to the development of stabilization strategies. This research investigated the physicochemical properties change in a broad temperature range (40-290 ºC). The fresh and aged oils were characterized by Karl Fischer titration, gel permeation chromatography (GPC), thermogravimetric analysis (TG), differential scanning calorimetry (DSC), and Fourier transform infrared (FTIR) spectroscopy to measure the physicochemical properties. The water content, high molecular mass (HMM) lignin content, viscosity, average molecular weight (Mn) and ash content increase with the increment in temperature and time of storage. The oils remain as a single phase throughout the study period. The decrease in dehydration temperature observed in DSC plots is coherent with the increase in water content as the aging period lengthened. DSC, FTIR and GPC results indicated sugars decomposition occurred when temperatures are over 150 ºC. The condensation or polymerization is in a dominant position regardless of temperature.

Characterization of Exosomes from Mammalian Suprachiasmatic Nuclei

Abstract:
Mammalian suprachiasmatic nuclei (SCN) are autonomous clocks that generate coordinated rhythms and drive oscillations in other peripheral tissues. We have identified that the conditioned media (CM) of SCN2.2 cells confer molecular rhythmicity to co-cultured fibroblasts via some diffusible factors. However, the type of signal that SCN cells use to coordinate circadian rhythmicity in fibroblast cells is currently unknown. Exosomes are extracellular nanoparticles that contain distinct subsets of RNAs and proteins. They play important roles in cell signaling, and intercellular communication. One potential mechanism of diffusible factors transfer from the SCN2.2 cells to the other cells is through exosomes. Therefore, studies were conducted to characterize SCN2.2 cell-derived exosomes. Exosomes were isolated and purified from CM of SCN 2.2 cells using a differential ultracentrifugation method. The morphology and size of the exosomes were visualized by transmission electron microscopy. The purified exosomes were disc-shaped vesicles with lipid bilayer membranes, and ranged from 30 to 150 nm in diameter. The exosomes were positive for exosomal marker CD63 by Western blot analysis. The exosomal RNA profile was different to those found in SCN2.2 cells, and revealed the presence of large amounts of small RNAs. There were approximately 50 proteins present in SCN-derived exosomes analyzed by the two-dimensional polyacrylamide gel electrophoresis. These studies demonstrated that exosomes were released from SCN2.2 cells. The characterization of SCN-derived exosomes is essential in furthering our understanding of the biological role of exosomes in circadian clock.
Poster Presentations

11:00 – 12:00

1. Najmeh Abedzadeh
Computer Science, Ph.D.
Using Flow Based Scatterplots to Represent the Correlation in Climate Dataset

Abstract:
We demonstrate a method for visualizing correlation in climate dataset. The core of this paper is representing the multivariate visualization in the domain of weather data analysis. Using Taylor approximation for calculating the derivative, flow based scatterplots are applied in this approach to show the interaction between different variables. These visual indicators, allow an interactive, and highly visual workflow which highlight significant associations in the data. We used storm dataset which has so many different variables to predict annual storm tack. This method represents whether the temperature is increasing or decreasing in every time step, related to other time steps. We have visualized the trend in change by arrows. Based on positive or negative slope of the lines, we can conclude the global trend as increase or decrease.

2. Molly Butts, Dan Gadke
School Psychology, Ph.D
Flashcard Intervention on the Acquisition of Sight Words

Abstract:
The current investigation evaluated several flashcard-reading interventions using brief experimental analyses (BEA) procedures. Furthermore, the selected intervention procedures were evaluated over time to monitor effectiveness. The results of a study that showed improvements in a 5th grader’s acquisition of sight words through a paired reading flashcard intervention. The BEA and intervention progress monitoring procedures will be presented for practitioner use.
3. Carley Calico, Laura Lemons
Agricultural and Extension Education, Ph.D.
**Measuring Student Critical Thinking in a Contemporary Issues Agriculture Course**

**Abstract:**
Agriculture is commonly acknowledged as an increasingly globalized industry. Additionally, agriculture has social, political, and ethical implications worldwide. It is fundamental that students studying agriculture develop critical thinking skills as they enter a complex and foundational industry. Researchers at the University of Florida developed the EMI: Critical Thinking Disposition Assessment to “more accurately measure critical thinking disposition” (Irani et al., 2007, p.4). This assessment measures critical thinking in terms of three constructs; Engagement, Cognitive Maturity, and Innovativeness (Irani et al., 2007). This study sought to measure critical thinking of students enrolled in Special Topics – Contemporary Issues in Agricultural and Life Sciences at Mississippi State University. Students completed the EMI instrument as an in-class activity during the first week of the Spring 2014 semester. At the end of the semester, students were again assigned to complete the EMI instrument, this time through Qualtrics, an online survey software. The EMI Assessment consists of 26 questions. Eleven questions measure the Engagement construct, eight questions measure the Cognitive Maturity construct and seven measure the Innovativeness construct. Means and standard deviations were calculated for the overall assessment as well as each construct for both the pre and post assessments. Overall, students’ (N = 24) mean scores on the EMI: Critical Thinking Disposition Assessment increased between the pre-test and the post-test. Further, the constructs measuring critical thinking aligned with the stated educational objectives for the course, indicating that the EMI is an appropriate assessment of student learning, understanding and critical assessment of current global agricultural issues.

4. Drew Cranford, Jarrod Moss, Adrian D. Lewis, Aaron Y. Wong
Cognitive Sciences, Ph.D.
**How Does the Story End? Eye and Mouse Movements in Language Anticipation**

**Abstract:**
Anticipating others' actions is an important process in facilitating language comprehension. There are multiple theories about how anticipation occurs. Serial models assume options are generated one at a time whereas parallel models (i.e., Construction-Integration model) assume simultaneous generation. In this study, participants listened to three-sentence stories and predicted the protagonists' final action by moving a mouse toward one of three options. Each story was presented with either one (1-Plausible) or two plausible options (2-Plausible). Prior results showed that initial mouse trajectories deviated further from the best option in the 2-Plausible condition compared to the 1-Plausible condition. The present mouse-tracking data were consistent with prior results. In addition, eye-tracking data showed that in the 2-Plausible condition compared to the 1-Plausible condition, participants made shorter fixations on the best option but made more fixations and spent more time fixating on other options. The results provide support for a parallel option generation process.
Exercise Physiology, M.S.  
The Effect of Commonly Used Alternative Footwear on Balance  

Abstract:  
Footwear is the critical link between the human body and environment by connecting the foot to the ground surface; and different types of footwear are shown to have varying effects on human balance. PURPOSE: The purpose of this study was to examine the differences in balance prior and after a transient low intensity workload while donning alternative footwear: crocs (CC), flip-flops (FF), and vibram minimalist shoes (MIN). METHODS: Eighteen healthy male adults (age: 22.9±2.88yrs) participated following a repeated measures design separated by a minimum of 72 hrs. Balance was assessed using Eyes Open (EO) and Eyes Closed (EC) conditions of the Sensory Organization Test (SOT) on the Neurocom® Equitest System using the equilibrium score while donning alternative footwear assigned using counter-balanced measures, prior to and after a one mile walk at a self-selected pace. RESULTS: The (3x2) (Footwear x Time) repeated measures ANOVA revealed significant differences in the EO condition for main effect time (p = 0.02) and between footwear during EC condition (p = 0.003). Post-hoc pairwise comparisons using a Bonferroni correction revealed significantly lower EQ score for posttest balance compared to pretest during EO and significantly greater EQ score for MIN compared to CC during EC. CONCLUSION: The one-mile walk caused a decrement in static balance in EO, which may be attributed to the workload suggesting possible localized muscular fatigue. The results of the EC condition suggest MIN allows for greater static balance compared to CC suggesting a greater availability of somatosensory feedback, with no visual information.

6. Ethan Flurry, Dr. Deborah K. Eakin  
Cognitive Science, Ph.D.  
One Man’s Neutral is Another Man’s Positive  

Abstract:  
The current study examines recall and metamemory judgments for words categorized as positive or neutral by group norms, and then by individual ratings. Memory performance is known to be better for emotional words versus neutral words. Accordingly, studies show judgments of learning (JOLs) are accurate for emotional words, demonstrating that metamemory can predict the effect of emotional valence on recall. These studies categorized words as positive or neutral according to each word’s mean rating in a database of emotional word norms. However, emotional valence may be experienced differently between individuals. For example, “pet” may be rated as positive by an animal lover, where it is rated as neutral by someone indifferent to animals. Although “pet” is positive according to the group norms, a person who rates “pet” as neutral might be less likely to recall “pet” than words they rated as positive. Studies of emotional valence effects on metamemory haven’t examined individual ratings, potentially resulting in misleading analyses of recall and JOL accuracy between positive and neutral words. The current study examines JOLs for positive and neutral words. Additionally, participants rate each word as positive or neutral. Recall and JOL accuracy are compared between positive and neutral words when categorized by individual ratings. Recall and JOL accuracy analyses for words categorized by individual ratings are compared to analyses for words categorized by group norms. Findings will be discussed in terms of theories of emotional memory and metamemory.
7. Christopher Hill, Harish Chander, Adam Knight, Hunter DeBusk
Exercise Physiology, M.S.
Impact of Low Intensity Workload on Muscle Exertion in Alternative Footwear

Abstract:
Localized muscular fatigue (LMF) have been identified in isometric contractions as low as 10% maximal voluntary contractions (MVC). Commonly worn alternative footwear due to their design features may contribute to LMF. PURPOSE: The purpose of the study was to analyze the impact of a low intensity workload on muscular exertion in three alternative footwear [Crocs (CC), Flip-Flops (FF), Vibram minimalist (MIN)]. METHODS: Eighteen males (22.94 ± 2.9 years; height 179 ± 6.0cm; 81.3kg ± 8.8kg) participated in the study, following a repeated measure design, with counter balanced footwear assignment. Post acclimatization, participants performed isometric mid-range MVC of plantar flexion and dorsiflexion, preceding and after a one-mile self-controlled walk on a treadmill. Muscle activity was collected on medial gastrocnemius (PF) and tibialis anterior (DF) using Noraxon EMG system. Mean muscle activity (µV) during MVC was analyzed using a 3x2 [Footwear x Pre-Post] repeated measures ANOVA at p = 0.05. RESULTS: Mean muscle activity showed no significant differences across the different types of footwear and between pre-post workload. CONCLUSION: Based on the MVC results, the self-paced one-mile walk did not contribute to LMF suggesting it, to be a non-fatiguing workload. Moreover, earlier studies have demonstrated differences in muscle activity with above ankle boot shaft footwear. None of the alternative footwear in this study extended beyond the ankle offering no restriction to the mid-range plantar flexion and dorsiflexion demonstrating no significant differences between footwear.

8. Carter Holland, Jack Sudduth, James A. Stewart, Donna M. Gordon
Biological Sciences, Ph.D.
AGEs and Aging: Eliminating RAGE Extends Lifespan

Abstract:
Stable advanced glycation end products (AGEs), such as carboxymethyl lysine, have been demonstrated to accumulate over time with age. This chronological accumulation of AGEs has given rise to what is known as the ‘Maillard theory of aging’, in which it is proposed that the chronic formation and accumulation of AGEs is a determinant for the rate of aging of an organism. RAGE, a multi-ligand receptor for AGEs, is normally expressed at low levels; however, its expression is increased during aging. A mechanistic link has been proposed in which increased AGE/RAGE signaling might accelerate the aging process to shorten lifespan. The purpose of this study was to determine whether AGE accumulation and subsequent RAGE activation leads to a perpetuated pro-inflammatory phenotype, a characteristic pathology associated with many age-related diseases, particularly cardiovascular diseases. Casual observations of the genetically altered, RAGE knockout (R-/−) mouse model noted these animals had significantly increased lifespans (6-7 years of age) as compared to their wildtype (WT) controls (2-3 years of age). RAGE activation has been demonstrated to trigger intracellular pro-inflammatory pathways culminating in the activation of transcription factor (NF)-κB and subsequent NF-κB-driven pro-inflammatory gene expression. In this study R-/− and WT mice (n=4-6 for each group) were aged for one year, sacrificed, and protein and RNA were isolated from cardiac tissue. Western blot analysis showed a significant 18% decrease (0.72 ± 0.02; p<0.05 vs. WT) in phospho-NF-κB in R-/− mouse hearts as compared to WT (1.00 ± 0.10) indicating a decreased NF-κB initiated pro-inflammatory response. Next, senescence, oxidative stress, and aging mRNA screens were performed using pooled mRNA from the individual heart samples to identify potential candidates responsible for R-/− mice longevity.
9. Kristi Jernigan, Dr. Joanne Beriswill
Education Technology, Education Specialist
Attitude and Knowledge of Computing as a Result Computer Programming Unit

Abstract:
The purpose of this study is to see if students gain knowledge and improve their attitude toward basic computing as a result of a particular unit of study related to computing and programming. The following research questions were answered: Is there a difference in attitude of students before and after taking a computer programming course? Is there a difference in content knowledge of students before and after taking a computer programming course? The sample consisted of 60 9th grade Science, Technology, Engineering, and Mathematics (STEM) application students, ages 14 to 16 years old. Participants completed a computer programming unit and learned basic programming skills using Scratch programming software. While working on the unit participants completed an attitude pre-post survey and a pre-post content knowledge test. Results of survey indicate students are believe programming is not as hard as they thought prior to taking computer programming unit and girls can do just as well as boys in computing. Results of content knowledge tests indicate students gained knowledge after completing computer programming unit. These findings suggest males and females gain knowledge and attitude is improved after participating in programming unit.

10. Lauren W. Jones
Cognitive Science, Ph.D.
Encoding vs. Retrieval Factors on Metamemory Predictions

Abstract:
Metamemory, what we know about our own memory, is measured by comparing predictions about memory with actual memory performance. Most metamemory research has examined how factors that affect encoding influence metamemory. For instance, some studies manipulated divided attention, a factor that impacts encoding by having people also do a tone discrimination task while studying word pairs (e.g., FROG - TOAD). Metamemory predictions followed memory outcome; both memory and predictions were lower in the divided attention condition. Just a few studies have examined how factors that affect retrieval impact metamemory. One study examined metamemory under retroactive interference and found a dissociation between memory and metamemory: predictions were higher for the condition in which memory was lower and vice versa. This study manipulated factors that impact both encoding (e.g., divided attention) and retrieval (e.g., retroactive interference) in the same paradigm to determine which type of factor has the stronger impact on metamemory predictions. Results showed that memory was worse under divided than full attention, but metamemory predictions did not reflect this difference. Predictions were the same for both attention conditions. For the retroactive interference conditions, memory and metamemory were dissociated; memory was better for the control condition, but predictions were lower for this same condition. Although their predictions were not accurate, the findings indicate that participants were basing their predictions on retrieval rather than encoding factors. The theoretical explanation for the dissociation will be discussed.
11. Victoria Lee, Curtis Kennett, Toni Copeland, Dylan Karges  
Applied Anthropology, M.A.  
Creating a Better Tomorrow Together: A Service Learning Project in Starkville, MS

Abstract:
Community is a concept that includes family and friends, local businesses, schools, services, and even sporting events. Being a part of a community is a key factor in creating, sustaining, and developing the social well-being of its people. Often it is the adults’ opinions and beliefs that shape the future of any community; children are rarely asked for their input. Their voices and hopes for the future of a community are seldom heard.

Objective: Creating a Better Tomorrow Together is a service learning project (SLP) committed to documenting elementary school children’s perspectives on the community of Starkville, MS.

Methods: Graduate students visited local elementary schools and asked fourth graders at those schools to reflect on Starkville today, to design their ideas for an ideal future community, and to portray these in artwork. Elementary school students accomplished this by drawing and creating pictures of many elements associated with the community of Starkville.

Key Findings to Date: These pictures were used to create a coloring book to give back to the kids, a full color book to give back to the schools and community, and an instruction manual for others who wish to perform similar service learning projects. The service learning project focuses on initiated change within the community, especially community cohesiveness through children’s eyes as well as empowering these children. It also encourages community engagement and partnerships between schools, higher education, and various community members.

12. Reeva Morton, Daniel Gadke, Carlen Henington, Kasee Stratton  
School Psychology, Ph.D.  
Analysis of Time Delay Procedures using the Acquisition of Sight Word

Abstract:
There are many prompting procedures used for individuals with autism (Handen, & Zane, 1987). Research suggests that, similar in application, progressive prompt delay and constant prompt delay, are independently effective teaching procedures (Walker, 2008). Progressive prompt delay is when the time delay between the prompt and the stimulus increases (Walker, 2008). Constant prompt delay time procedure is when the delay interval is held constant throughout the intervention (Walker, 2008).

Although there is research on time delay procedures, few articles have compared time delay procedures, progressive prompt delay and constant prompt delay to one another and to individuals on varying places on the spectrum (Ault, Gast, & Wolery, 1988). This study used two prompting procedures, progressive prompt delay and constant prompt delay, to measure the number of sight words to two boys with autism spectrum disorder. An alternating treatment design was used to evaluate the effectiveness of the instructional strategies. Effectiveness was measured in percent of words correct. Results suggested that both prompting procedures demonstrated improvement. Although, there were little difference in the prompting procedures individually they both resulted in gains for increasing sight word fluency. Blocking procedures were used for data analysis. Implications for future research are discussed.
Forest Resources (Forest Economics and Policy), Ph.D.
Using Contingent Valuation Method to Estimate Willingness to Accept Compensation to Provide Ecosystem Services

Abstract:
This study was based on contingent valuation method to determine the willingness to accept compensation (WTA) for the provision of multiple ecosystem services involving a hypothetical 40-acre pine plantation enrolled in the Conservation Reserve Program (CRP). The research was based on a mail survey conducted with 2,025 nonindustrial private forest landowners (NIPF) and 663 returned questionnaires. The four forest management alternatives were immediate clear cutting (baseline), delayed harvest for 10 years with all silvicultural activities allowed (B), delayed harvest with some silvicultural activities allowed (C) and delayed harvest with no silvicultural activities allowed (D). These were offered to landowners at 15 bid levels. WTA compensation values and 95% confidence intervals were generated using Krinsby-Robb procedure while random effects probit model was used to examine socio-demographic and economic factors underlying WTA compensation. The mean/median WTA values were $188.11, $228.48 and $377.98/ha/year for B, C and D respectively. WTA compensation values increased with the number of silvicultural restrictions. Furthermore, these values were influenced by the treatment of unsure responses in the analysis. Monetary compensation level and landowner long term investment objectives had a positive and significant impact on the probability of accepting bids for all alternatives (p<0.05). Provision of optimal financial incentives and integration of landowner objectives are important for enhancing provision of ecosystem services.

Industrial Systems Engineering, Ph.D.
Interdicting Attack Graphs to Protect Organizations from Cyber Attacks: A Bi-Level Attacker-Defender Model

Abstract:
Today's organizations are internally open and connected, sharing knowledge and ideas in order to remain innovative. As a result, these organizations are also more vulnerable to information theft through different forms of security breaches caused by hackers and competitors. One way of understanding the vulnerability of an information system is to build and analyze the attack graph of that system. The attack graph of an information system contains all the paths that can be used to penetrate the system in order to breach critical assets. Although existing literature provide an abundance of attack graph generation algorithms, more methods are required to help analyze the vulnerability of attack graphs. In this paper, we study how best to deploy security countermeasures to protect an organization by analyzing the vulnerability of the organization through the use of its attack graph. In particular, we present an approach to find an optimal subset of arcs, called an interdiction plan, on an attack graph that should be protected from attack to minimize the loss due to security breaches. We formulate this problem as a bi-level mixed-integer linear program and develop an exact algorithm to solve it. Experiments show that the algorithm is able to solve relatively large problems. Experiments also reveal that the quality of an interdiction plan is relatively insensitive with respect to the error in the estimate of the attacker's budget, and that the breach loss drops sharply at the beginning, then levels off before finally dropping sharply again with increases in the security budget.
Mohsen Parsafard, Xiaopeng Li, Jianxun Cui, Shi An
Transportation, Ph.D.

A Describing Function Method for Traffic Oscillation Analysis: Environmental Impacts and Oscillation Mitigation

Abstract:
Traffic oscillation incurs a number of adverse impacts to highway traffic efficiency and sustainability such as excessive travel delay, extra fuel consumption and emission. This study first adapts the describing-function (DF) based method [Li09c, Li12] for estimating fuel consumption and emission emerged from traffic oscillation. We integrate the DF approach with existing estimation models of fuel consumption and emission to analytically predict environmental impacts (i.e., unit-distance fuel consumption and emission) from traffic oscillation. The prediction results by the DF approach are validated with both computer simulation and field measurements. Further, we explore how to utilize advantageous features of emerging sensing, communication and control technologies, such as fast response and information sharing, to smooth traffic oscillation and reduce its environmental impacts. We extend the studied car-following law to incorporate these features and apply the DF approach to demonstrate how these features can help dampen the growth of oscillation and environmental impact measurements. For information sharing, we convert the corresponding extended car-following law into a new fixed point problem and propose a simple bisecting based algorithm to efficiently solve it. Numerical experiments show that these new car-following control strategies can effectively suppress development of oscillation amplitude and consequently mitigate fuel consumption and emission.

Destiny Peterson, Jared Keeley
Clinical Psychology, Ph.D.

Evaluation Clinicians' Differential Diagnostic Decisions for ICD-11 Psychotic Disorders

Abstract:
The International Classification of Diseases, 10th edition (ICD-10) is currently under revision and major changes are happening to the Mental and Behavioural Disorders chapter. The goal of the revision process is to increase the clinical utility of the diagnostic system. This study is the first phase of the electronic field trials for ICD-11 psychotic disorders. The present study compares specific changes being made to the psychotic disorders diagnostic guidelines by directly comparing ICD-10 and ICD-11. Participants in this study came from the Global Clinical Practice Network which was created by the World Health Organization in order to have an international sample of mental health professionals to participate in the ICD-11 electronic field trials. Specifically, we compared clinicians' accuracy in differential diagnoses of vignettes conceptualizing disorders with similar and overlapping symptom presentations. We used a series of eight comparisons of two vignettes each and participants were randomly assigned to use either ICD-10 or ICD-11 diagnostic guidelines. Using a series of chi-square and G-square analyses we found that clinicians using both systems were able to differentiate disorders with a high potential to be confused (e.g., Schizophrenia and Schizoaffective Disorder). However, we did find improvements in ICD-11 over ICD-10 for some diagnostic guidelines that are being drastically changed between the two systems. Based on our initial findings it appears that the proposed changes for ICD-11 are in fact increasing the clinical utility of the diagnostic system and subsequent field trials will continue to expand on improvements in clinical utility between the two systems.
17. Sushil Raj Poudel, Dr. Linkan Bian, Dr. Mohammad Marufuzzaman  
Industrial and System Engineering, Ph.D.  
**Designing a Reliable Bio-Fuel Supply Chain Network Considering Link Failure Probabilities**

*Abstract:*  
This study presents a pre-disaster planning model that seeks to strengthen a bio-fuel supply chain system's intermodal hub links while accounting for limited budget availability. The model presented here determines which set of hubs and links to select that will maximize post-disaster connectivity and minimize bio-fuel supply chain related costs. The failure probability of the links between the intermodal hubs is estimated using a spatial statistic model, which is developed from real world data. This paper develops a combinatorial Benders decomposition algorithm to solve this challenging NP-hard problem. The proposed algorithm is validated via a real-world case study with data from Mississippi and Alabama. Computational results show that the proposed solution approach is capable of solving the problem efficiently. Several experiments are conducted to demonstrate the applicability of this model by testing various model parameters on bio-fuel supply chain network performance, including reliability improvement cost, availability of budget, biomass supply changes, and the risk averseness degree for decision makers. Numerical analysis indicates that, under normal conditions, the minimum cost model determines a unit bio-fuel delivery cost of $3.56/gallon. However, in case of a disaster, the unit bio-fuel delivery cost provided by the minimum cost model increases to $3.96/gallon, compared to $3.69/gallon provided by the reliable model solution.

18. MacKenzie D. Sidwell, Molly M. Butts, Sarah S. Mullins, Dan Gadke  
School Psychology, Ph.D.  
**A Preliminary Investigation of the Autism Social Skills Profile in a Field Based Setting**

*Abstract:*  
Despite the availability of several well-known and established measures of social skill behavior, including the Social Responsiveness Scale (SRS-2; Constantino & Gruber, 2012) and the Social Skills Improvement System (SSIS; Elliott & Gresham, 2008), there remains limited data on similar measures, which may be more affordable and readily available to practitioners, such as the Autism Social Skills Profile (ASSP; Bellini, 2006). The current study is a preliminary investigation into the clinic utility of the ASSP. Although additional data are currently being collected, data were collected during a four-week social skills clinic. The sample included five participants ranging in age from 8 to 13 years old, each with a diagnosis of an Autism Spectrum or related disorder. The primary purpose of the study is to explore additional methods to more effectively measure social skills outcomes in school and clinic based settings. The researchers seek to provide evidence that the ASSP, which is a more easily accessible and affordable measure, provides valuable and observably validated outcome data. Pre- and post-ASSP data were compared to time-series observed social skills data across four weeks.
School Psychology, Ph.D.
Analysis of Instructional Activities on the Acquisition of Social Skills for Children with ASD

Abstract:
Given the social skill deficit associated with children with an Autism Spectrum Disorder (ASD), it is no surprise there is no shortage of literature on various interventions targeting the skills. The current study analyzed the impact of various instructional activities used during a 4-week social skills group on the acquisition of social skills. An alternating treatment design was implemented across three social skills group with children ranging in age from 5 to 14 years old diagnosed with an Autism Spectrum or related disorder. Intervention aimed to increase the occurrence of several developmentally appropriate social skills. Intervention took place in a group setting for four hours a week, over four consecutive weeks. Students were separated into three social skills groups based on age. Social skill instruction was divided into four different methods of delivery: lesson, play, craft, and a team-based activity. A combined frequency count of target appropriate social behaviors was collected for each child across all three of the social skills groups. Data will be analyzed across behaviors, age groups, and type of intervention delivery method. Results and implications will be discussed.

Clinical Psychology, Ph.D.
Fluctuation in Self-Reporting Motivation is Negatively Associated with Effort for Reward

Abstract:
Anhedonia, or the loss of interest or pleasure, can refer to deficits in anticipatory pleasure (i.e., ‘wanting’ things), or in consummatory pleasure (i.e., ‘liking’ things). Depression is generally associated with deficits in anticipatory pleasure. However, action orientation, a component of which is the ability to upregulate positive affect for goal pursuit, may act as a buffer against anticipatory pleasure deficits so that effort can be mobilized for goal pursuit in stressful situations.
The current study examined relationships between stress, action orientation, and anhedonia. Ranging from two weeks to three months after they completed preselection via self-report measures, participants were brought back to complete a laboratory session, during which they again completed these measures, a stressful mood manipulation, and the Effort-Expenditure for Reward Task (EEfRT), a behavioral measure of willingness to work for reward.
Hierarchical regression analysis was used to examine the relationship between action control, anhedonia, and level of effort over time. Although reported action orientation scores were not significantly associated with level of effort for reward, $b = .80$, $t(69) = .61$, $p = .546$, changes from pre- to post-test on this measure were negatively associated with effort for reward when controlling for changes in reported anticipatory pleasure, $b = -.24$, $t(68) = -2.09$, $p = .041$. This suggests that fluctuations in action orientation over time may be associated with decreased willingness to work independent of trait anhedonia. Future research can further examine this relationship in addition to behavioral markers of psychopathology.
Abstract:
The effects of alcohol use history and acute alcohol intoxication on intentional self-injurious behaviors were examined. Participants (N = 106) completed a self-report measure (Alcohol Use Disorders Identification Test: AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) to assess alcohol use history. Participants were assigned to either a placebo condition or alcohol sufficient to produce BAC = .10%. Participants in both conditions completed a laboratory task assessing self-injurious behavior (the Self-Aggression Paradigm: SAP; Berman & Walley, 2003; McCloskey & Berman, 2003). Specifically, participants were given the opportunity to self-administer a shock from a range of intensities on 20 of 40 trials during a competitive reaction time task with a fictitious opponent (the cover task). Shocks ranged from “0” (no shock) to “10” (prior determined pain-threshold) and a “20” (ostensibly twice the pain-threshold but equal to the pain threshold). Self-aggression was measured by the mean shock intensity chosen. A moderated multiple regression analysis controlling for gender revealed main effects for drink condition and gender. Those in the BAC = .10% condition (N = 57, M = 5.42, SD = 3.77) and men (N = 53, M = 6.24, SD = 3.40) set higher shocks than those in the placebo condition (N = 49, M = 3.5, SD = 3.39) and women (N = 53, M = 2.85, SD = 3.22). No main or interaction effects were found for AUDIT scores. These findings suggest that degree of intoxication and gender are better predictors of self-injurious behavior compared to a history of alcohol use.